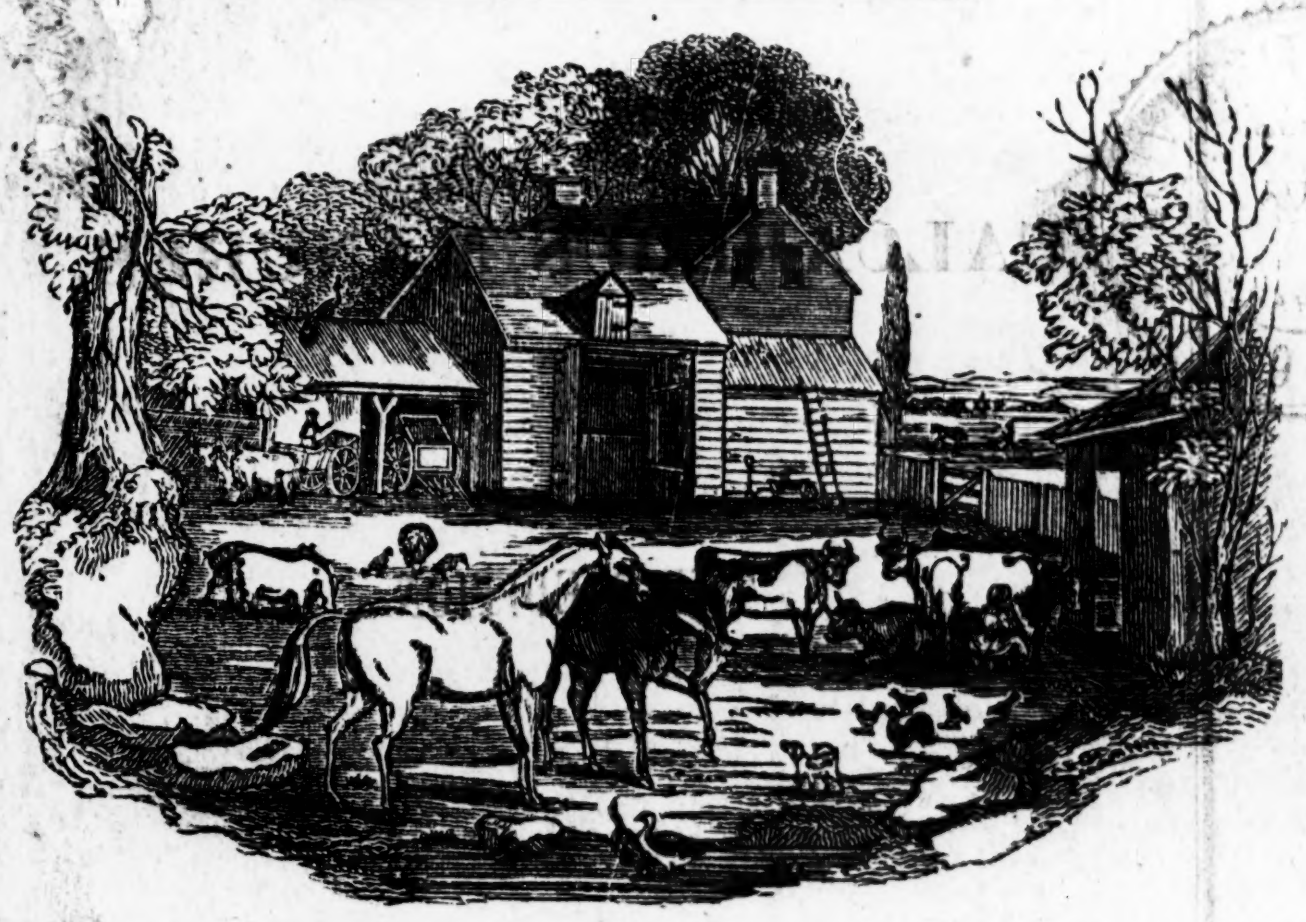
Gov. L. W. Tazewell

THE FARMERS' REGISTER:

NEW SERIES.

EDITED BY THOMAS S. PLEASANTS.

Published Monthly, at Five Dollars a year, in advance.



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AN ESSAY

ON

CALCAREOUS MANURES.

THIRD EDITION.

BY EDMUND RUFFIN.

Petersburg:

LAURENS WALLAZZ, PRINTER.

1842.

THE FARMERS' REGISTER.

THOMAS S. PLEASANTS, EDITOR.

NEW SERIES. FEBRUARY 28, 1843. VOL. I.—No. 2.

REPORT TO BOARD OF AGRICULTURE,

ON ROCKBRIDGE COUNTY.

(*Continued from page* 40.)

Rockbridge, Jan. 21*st*, 1843.

DEAR SIR.—As desired, I forward the remainder of my report to the Board. I have been so careless, that I feel somewhat in doubt how far I have copied—but believe to the quantity of manure needed for our "greedy corn crop." Experience, too, has taught us here, that this can rarely be applied advantageously directly to the wheat crop, greatly increasing its growth of straw, and its liability to lodge and rust. And I am satisfied a large majority of the practical farmers of our country will say, they make better crops and keep their lands in better heart, with less labor and expense by the rotation system, than by any other yet devised; applying all the manure their farms will make, (and all should be most carefully husbanded,) to the corn crop. If a good growth of clover has been ploughed in *deep*, late in the fall, or early in the spring, and *all* the manure, (too much cannot be applied,) shoveled in, or harrowed in, if not applied before the first ploughing, the profit of the corn crop will be in proportion to the quantity of manure employed, and the care in the tillings; and after cutting up the corn, again ploughing so deep as to bring the decomposed clover *with its seed* to the surface, no better preparation can be had; and in propitious seasons, the wheat will be fine, and again succeeded by a new growth of clover, which in two or three years will again be ready for this simple and profitable rotation. At the same time keeping the uplands, too steep for corn, for the clover and small grain rotation, or for pasture. My own experience induces me to believe this is the best system we can possibly adopt—modifying it of course according to circumstances, and the fertility or poverty of the soil.

In 1824 I commenced the use of lime, and with such decided benefit, that I have been induced to continue it occasionally, as opportunities would allow for the burning of it. But it can hardly be said to be systematically used by any of us yet—our land being very readily improved to almost any extent, by ploughing under clover, or suffering it to shade and rot on the surface.

In regard to the "depth and manner of ploughing" here, I believe it is generally conceeded that, for all crops, *deep* ploughing is advisable. By the operation of frost and air, a shallow soil is thus made deep; and the roots of corn will find moisture in the driest season, and be less liable to be blown down by storms. It affords the best bed too for wheat, as the superfluous water will sink beneath its roots, and thus lessen the danger of being winter killed. Our wheat is usually harrowed in. The plough chiefly employed is McCormick's two-horse—but we have also the more complicated Loudon barshare, better adapted to turning over a close sod. The Livingston, New York cast iron plough, is also used on many of our farms. It may be well to remark here, that on all hilly farms there should be at least one *left handed* plough. A hill may sometimes be ascended at three or four degrees to the left, when the ascent to the right might be 10 or 15 degrees, or even impracticable. They are also better adapted to awkward lead horses, and awkward drivers.

"Fencing and enclosing." The common rail, with $4\frac{1}{2}$ feet worm, is in most general use, but occasionally you see the "Jefferson," or stake and cap fence; now and then the plank fence, with locust post, and occasionally a few rods of stone fence. Fencing is one of our heaviest taxes, and in consequence much of our wood land is yet unenclosed. But when enclosed they afford so fine a range for sheep and hogs, the former more especially, that great efforts are making to enclose as much as possible with contiguous fields. When thus protected from "every body's stock," the young timber grows up more rapidly, and the wild pea-vine, the rich weed, and other weeds, afford food which seems particularly adapted to sheep.

"Obstacles to improvement, including the operation of the laws or governmental regulations." A sheet might be filled in pointing out the baneful effects of our law of inclosures alone. But we live in an age of demagoguism, and we can hardly expect our legislators will risk their *popularity* by any innovation on ancient usage, however pernicious such may be. Indeed, during the rage for president making and the discussion of federal politics, how can we expect them to know any thing of an evil so local in its character, or to turn aside a moment to look at our clodhopping interest? Besides these gentlemen are for "free trade," and uninterrupted communication, and it

would be wrong to prevent my neighbors' stock from ranging where they please. And besides it would destroy the fun of galloping through the plantation, at killing time, after "wild-hogs." But jesting aside, have you seen one individual who could assign a good reason, or any reason, why every man should not be compelled to take care of his own stock, instead of having that of a half a dozen neighbors to take care of? Or have you ever had patience to calculate the saving of time and fencing, and therefore the additional time that might be devoted to the products of the soil, and the aggregate exports of the state by abolishing the existing law, and at least substituting that of Pennsylvania, which certainly removes the evil one half?

I hope in your retirement you will not loose sight of this subject, but give to your successor the benefit of your counsel and experience; thus adding greatly to the debt of gratitude already due from the agricultural interest of our state. ROBT. R. BARTON.

ED. RUFFIN, ESQ., *Cor. Sec. B. of Agr.*

P. S. Our ploughs have been for some days engaged in breaking up for corn and oats.

ALTERING MALE QUADRUPEDS.

After commencing operations as a farmer, I observed, with regret, the barbarous method of operating on domestic animals, particularly upon swine, and in filling the bag with salt or ashes; but those who were accustomed to this method could not be persuaded to adopt any any other practice. The salt and ashes applied on such occasions act as a styptic, and prevent bleeding, but they excite inflammation and endanger the life of the animal. I have noticed the agony and uneasiness of pigs after such applications, and have recommended milder ones. In 1840 I lost a large shoat in three days after the operation, and came near losing a steer by bleeding from the cord. The method which I consider preferable is exhibited in the following instances.

September 15th, 1842. Altered a large Berkshire boar, three years and a half old, one that no person would undertake to castrate, lest he should die after the operation. I found a man, however, who was willing to act under my directions. He used a sharp knife and made a smooth cut, and after laying bare the testis, I applied a ligature on the cord, as a surgeon would to a bleeding artery, and then cut the cord below the ligature. The second testis was removed in the same manner, and the wound dressed with a mixture of tar and grease. The operation was soon performed, there was no bleeding from the wound, and the animal seemed to mind it no more than a kick. He ate his allowance daily afterwards, and never fell off in flesh from the operation, and is now (November) a fat hog.

On the same day nine boar pigs which had been weaned some time, were altered without tying the cord, and the wounds rubbed with the mixture of tar and grease. They never lost a meal nor appeared to suffer pain or inconvenience from the operation, and all speedily recovered.

October 7th, 1842. Altered a two-year old Galway bull by the same method. Having prepared a waxed thread, the cord was tied, and the testis removed as in the case of the boar, with the loss of only a few drops of blood in cutting through the skin. The wound was rubbed with the tar and grease, and the animal, after being kept in the barn yard a few nights, was suffered to run in the field. The ligature comes away by the sloughing or rotting of the lower end of the cord, and then the wound heals.

On the same day another stout Berkshire boar, one year old, was operated upon in the same manner, without the loss of blood or flesh. He recovered rapidly, and is now (November 9th,) in a fair way to make a heavy porker. RICHMOND.

Albany Cultivator.

PUMPKINS.

Wilson county, September, 1841.

Early in April I ploughed a small field, deep and close; threw about eight buck-loads of barn-yard compost broadcast to the acre, and forthwith planted pumpkin seed at five feet distance in checks. I cultivated as corn until the middle of May, when the ground was pretty well covered in the more luxuriant spots with the vines. I then took hoes in hand and planted, in the replanting manner, corn in each pumpkin hill—the corn having remained in soak forty-eight hours. It came up at once, grew off kindly, and yielded a fair crop of corn—no vacant rows—corn in all.

Previously the pumpkin vines got such a start they were not checked by the growth of the corn, and now exhibit a small field more abundantly bespeckled with pumpkins, than any I ever saw by four-fold. My neighbors seldom pass without inquiring how I raise so many pumpkins and a fair crop of corn together? I tell them frankly the mode of culture, and the pumpkins show the result. I am astonished at my success; my little field—I ought to call it patch—is the admiration of all, and if this short account of the matter should be the means of helping my brother farmers to a like success, the end in view is obtained.

PARVUS AGRICOLA.

Nashville Agriculturist.

NUTRITIVE QUALITIES OF CHARCOAL.

Though the importance of mixing charcoal with the food of animals, particularly that of swine, has been generally acknowledged, and its benefits extensively tested, still it has been supposed that it only acted as a corrective to the acid tendency of food, and facilitated fattening by improving the health of the animal. Some experiments are, however, on record, which would seem to show that charcoal acts

a more important part in the matter than has been usually assigned to it.

In 1793, a family being driven from New York by the fever, were absent six or eight weeks before it was deemed prudent to return. A number of fowls confined in a loft to the workshop of the house, were forgotten at the time of leaving, and as it was known that there was nothing provided for their subsistence, it was expected on the return that they would be found starved to death. To the astonishment of all, the fowls were found alive and fat, though there was nothing upon which they could have fed, except a quantity of charcoal and shavings, water being supplied from the grindstone trough.

These facts coming to the knowledge of a gentleman in New York, as we learn from the Recorder, he instituted the following experiment. He placed a turkey in a box or enclosure, four feet long, two feet wide, and three feet high, excluded light as much as could be done, and allowed a free circulation of air, and fed the turkey with soft brick, broken fine, pounded charcoal, and six grains of corn per day. The box was kept locked. At the end of a month, the turkey was killed in the presence of several gentlemen, was large and heavy, and on being opened was found filled with fat. Nothing, on dissection, was found in the gizzard and entrails but charcoal and brick. Last winter the experiment was repeated, and with the same success.

Several years since, in fitting out one of the Liverpool traders at New York, a pig on board was missing, and was supposed to have been lost. The cargo was taken on board, stowed, and the vessel sailed. It was now discovered that the pig was alive in the coal hole, but as he could not be got at readily, it was concluded to leave him to his fate. He remained in this retreat until the passage was made, when his pigship was found to be not only alive and well, but materially improved in condition, though there was nothing, coal excepted, he could have swallowed.

When it is remembered that wood, sugar, and several other substances, some of which are most nutritive, are compounded of nearly the same original elements, it would seem possible, by animal chemistry, to convert them to saving life; though all experiments with wood or charcoal failed. The German chemists have converted wood into very palatable bread, by roasting and pulverizing; but calcination, it has been supposed, would destroy whatever powers of nutrition wood might originally contain. The chemical action of vegetables seems to produce the least effect on coal, and not the least particle of it has ever been found in the structure of vegetables, though mixed with the earth and water in which plants were growing, in the form of the most impalpable powder. Whether animal chemistry is able to do what vegetable organization cannot, remains to be seen; though if there is no mistake in the statements alluded to, it would seem probable that this intractable substance is, in some way, made subservient to the nutrition of animals.—*Genesee Farmer.*

ASHES FOR TOP-DRESSING, &c.

To the Editor of the Farmers' Monthly Visitor.—There has been quite a spirit of farming awakened the last year or two in this section of Massachusetts. Some of our people have purchased largely of leached wood ashes, and the results have conquered the doubts of the sceptic, and even astonished the believer.

Capt. Leonard West, of Chilmark, (adjoining town,) upon a small farm for which he paid twenty-five hundred dollars, commenced three years ago the use of ashes as a top-dressing, being withal a most industrious collector of other manures. When he bought this farm, it had been exhausted by bad management—there was *one* ton of hay taken from the meadows—this year he cut *thirty* tons. He has about fifty acres of arable and meadow land, chiefly exhausted by close cropping and bad management. It is a pattern of neatness. When he took it, the stock consisted of a cow and horse; he has now — head, and declares his belief that he can bring it to summer and winter fifteen cows and a good proportion of other stock. He will do it. He has to haul his ashes eight miles: they cost him thirteen cents per bushel at the place of landing. They repay the first cost and every other expense from the first crop, and leave after crops and the general improvement of the land, as the profit.

With us, *no* manure has the effect of ashes. A few years ago, for an experiment, I ploughed up an acre and a half of very dead land, and planted it with corn—the product, though the season was good, was *six bushels per acre.* Early next spring, I ploughed up the hills, and sowed oats with ten pounds of clover seed to the acre, and thirty-five bushels of unleached ashes over the whole piece. The oats were good, but the clover was superfine; at least a ton and a half to the acre upon ground of the very poorest description. The effect of it was seen for years. But to test the greatest capacity of ashes to stimulate production, the grounds should be entirely free from weeds when they are sown. And to render the effect permanent and enduring, other manures, having body, should be added. If no other manures accompany the ashes, then the ploughing in of the green clover will be singularly beneficial.

NEATNESS IN AGRICULTURE.

The remark that agriculture and civilization keep pace with each other, may be applied to individuals as well as nations. If in passing through a country, we were to discover a miserable and wretched system of agriculture, we should not expect to find an educated and intelligent people; nor in passing a farm, characterized by every mark of neglect and indolence, should we expect to see in the owner, an industrious and intelligent man. —*Farmers' Cabinet.*

VEGETABLE PHYSIOLOGY AND CHEMISTRY.

BY HENRY R. MADDEN, M. D.

The application of the principles of Vegetable Physiology and Chemistry to Agriculture.

I. *Soil.* Science has already proved, in the most satisfactory manner, the following circumstances regarding soil:

1*st.* In order that it may be fertile,

(1.) It must contain all the mineral matters found in the ashes of the plant destined to be cultivated upon it, in such a condition as to be available by the plants, and in sufficient quantity to enable the supply to be kept up by some economical mode of cultivation.*

(2.) It must consist of a due admixture of impalpable matter and larger sized particles, so that it may be porous and easily permeable by air and moisture, while, at the same time, there is a sufficient supply of matter in a state capable of undergoing chemical changes.

(3.) There must be a sufficient supply of organic matter mingled with it, in a state capable of decomposition by the action of air and water.

2*d.* To be fit for profitable cultivation,

(4.) It must be free from any mineral substance which is destructive of fertility.

(5.) It must be capable of being reduced to a sufficiently fine tilth, without an undue amount of labor.

(6.) It must either be naturally capable of letting off any excess of water which may fall upon it, or it must be capable of being made to do so artificially by draining.

(7.) It must possess a structure which will allow the decomposition of organic matter mingled with it, to proceed at a regular rate, being neither so fast as to waste the manure, nor so slow as to keep the dung too long fresh.

(8.) Its situations must be such as to admit of all the operations of husbandry being performed in a proper manner, without occupying too much time; and the climate must permit of the plants arriving at perfection.

3*d.* To be capable of continued cropping, the farmer must endeavor to keep up the essential qualifications of the soil in the following manner:

(9.) It must be ploughed and harrowed, and subjected to any other operations which may be necessary to pulverize it.

(10.) It must have its supply of organic matter, and part also of the mineral ingredients, renewed by returning to it from time to time, in the shape of manure, what has been removed in the form of crops.

(11.) It must be kept in an active state, by having fermenting substances added to it at certain periods.

4*th.* To correct any natural faults which the soil may possess, it must be subjected to the various processes which have been proved by experience to cure the faults in question; these we shall mention presently, and note under each head what are its effects, and under what circumstances it should be had recourse to.

We shall explain the reasons for all these requisites, and point out the practical advantages of being intimately acquainted with them; and likewise allude to what science may still effect, so as to increase our knowledge upon each point.

(1.) In order that soil may be fertile, it must contain all the mineral matters found in the ashes of plants destined to be cultivated upon it, in such a condition as to be available by the plants, and in sufficient quantity to enable the supply to be kept up by some economical mode of cultivation.

The necessity of this condition depends upon the well established fact, that plants cannot make for themselves any of the elementary substances which they contain, but are only capable of changing the form in which these are combined with one another. Thus, the organic portion of plants, or that which is destructible by fire, is composed of four elementary substances, namely, carbon or charcoal, and three gases named oxygen, hydrogen, and azote. Now, plants cannot produce any of these four substances under any circumstances whatever: but if they are supplied with them in almost any state of combination, they can, by their vital processes, convert them into starch, gum, woody fibre, or whatever else they may require. The same is the case with the constituents of their ashes. They must be supplied with the requisite elements in some state of combination, and then they will be able to produce for themselves the particular compound which they require.

Farmers have hitherto paid far too little attention to this; they have never been supplied with the information requisite for discovering the substances of which their crops are composed, and therefore they are not capable of judging correctly regarding the results which they obtain; for example, if one sees that a plant will not grow on a sandy soil, he tries it upon clay, and, finding it to succeed there, at once feels satisfied that the latter is the soil most fitted for its growth; but another farmer sowing the same seed upon clay land obtains so poor a return that he determines to try it upon sand, and in this instance obtains an abundant crop, so of course is equally convinced that sand is the proper soil for the plants, and that to sow it upon clay is to waste both the manure and the seed. Now chemical analysis would have proved in this instance, that the rocks from which the first farmer's clay and the second's sand were produced, contained a good supply of some peculiar compound, which compound also existed in the ashes of the plants in question, and consequently the knowledge of this fact would have prevented both failures, and would have enabled each farmer to determine the true cause of his success, without leading them to contradictory conclusions. Such knowledge as this is quite practicable, even in the present state of the science; for the ashes of most cultivated

* In all these statements we shall speak of the circumstances proved by science, as they influence practical agriculture, and not as abstract questions of philosophy.

plants have been analyzed, and all rocks have been most minutely examined, so that any farmer possessing a sufficient acquaintance with mineralogy or geology, to enable him to determine the species of rock which has given origin to his soil, will, by referring to any work containing the analysis of minerals, be able to learn pretty accurately the contents of his soil; and some other book of reference will give him the composition of his crops; a comparison of the two will lead him so far towards a just conclusion as to what crops will best suit his particular farm. We must admit, however, that a considerable increase of knowledge is required before this can be brought to perfection; for even after the comparison of the analysis of soil and crop, as above recommended, had shown a sufficient similarity of composition to warrant the belief that a plant would thrive well in some particular situation, the farmer might find that, after all, his crop was so scanty that it was not worth his while to expend any trouble upon its cultivation. Although science has already done much, more extended and minute research is greatly needed before this branch of the subject can be considered as at all approaching perfection; and we have no hesitation in affirming, that we believe much of the future progress of agriculture will depend upon increased knowledge in this wide field of chemical inquiry.

(2.) Soil, to be fertile, must consist of a due admixture of impalpable matter and larger sized particles, so that it may be porous, and easily permeable by air and moisture, while, at the same time, there is a sufficient supply of matter in a state capable of undergoing chemical changes.

No fact has been more satisfactorily proved than the necessity of impalpable matter in soil; indeed, we may estimate pretty nearly the value of all soils, with the exception of clays, merely by determining the quantity of impalpable matter which they contain.*

The value of the impalpable matter is threefold. *First*, Many of the most useful ingredients of soil are of no value to plants until they are reduced to this extremely fine state of subdivision. *Second*, Even the alkalies, and other soluble components of rocks, are scarcely at all dissolved by water until the rock has crumbled to the finest dust. *Third*, all the useful organic matter of soil is in a state of combination with this powder, so that, in fact, to a certain extent, the whole value of the soil resides in this portion alone. But larger sized grains are absolutely necessary to make the soil fertile; not that they are themselves directly useful to plants, but because, without them, the other ingredients could not act effectively. This depends upon the necessity of air and water getting free access to every part of the soil, which could not be the case were it composed altogether of impalpable powder; because this would become so compact after it had once been moistened, that it would form a cake quite impermeable by air; and after it had once become thoroughly dry, almost equally impermeable by the roots of plants. Were it not that the larger particles are continually crumbling down, and adding to the impalpable powder those materials which would otherwise become gradually exhausted, and thus serve to keep up the original fertility of the soil, it would be of very little consequence of what these grains were composed; for, until they are reduced to powder, they exert no direct influence whatever upon the vegetation of the soil, of which they form a part. The practical advantage of knowing the above facts will afterwards be shown.

(3.) There must be a sufficient supply of organic matter mingled with the soil in a state capable of decomposition by the action of air and water. Vegetable physiologists are much at variance as to the exact manner in which organic matter in soil affects the vegetation upon its surface, owing to some experiments which have proved the *possibility* of plants growing in soils destitute of all organic matter; but still they are quite agreed that, for the purpose of farming, there must be a good supply of elements entering into organic products; nay, they will admit that, *cæteris paribus*, the quantity of vegetable and animal matter in soil is a direct index of its fertility. This being the case, we need scarcely remark, that a knowledge of the fact must be valuable to the practical farmer, because the processes necessary to ensure good crops must be greatly varied according to the abundance or scarcity of organic matter in the soil. If in poor land this matter abounds, something must be done to bring it into a more active state; if it is deficient, good crops can never be raised until a good supply is given it in the form of animal or vegetable manure. On this point we may expect great assistance from science; for hitherto we are very ignorant of the exact requisites, as regards organic matter in a soil, to suit it for each particular crop; and yet experience daily proves to us that there exists some peculiar relation between the two, which it has hitherto baffled all the endeavors of chemistry to detect. Should this difficulty be overcome, which we by no means despair of, the art of agriculture will acquire a degree of precision and certainty quite unattainable in the present state of our knowledge.

(4.) Soil, to be fit for profitable cultivation, must be free from any mineral substance which is destructive of fertility. We need scarcely offer any explanation of a fact which is so self-evident; because, however well a soil may be supplied with all the requisites of fertility, if it contain a single substance which is destructive to the growth of plants, it will of necessity follow that the soil must remain useless until this injurious matter be removed. The evident advantage of knowing the substance producing the sterility is, that chemistry can in very many instances suggest some practicable method by which the fault may be overcome. Thus, if

* This experiment is easily performed. Take a glass tube about an inch in diameter, and two feet long, closed at one end; put into the tube about two inches of the soil to be examined; fill the tube three parts full of water, and shake well; place it upright, and let the soil subside; the impalpable matter will form the uppermost layers of the deposite, and its quantity per cent. is easily found by measurement and calculation.

the barrenness depend upon an acid, lime will cure it; if upon some soluble salt of iron, here again lime is needed; if upon some compound of magnesia, free exposure to the air will overcome the bad effects.

(5.) Soil must be capable of being reduced to a sufficiently fine tilth without an undue amount of labor, in order that its culture may be profitable. It does not require the aid of science to explain this statement, as it is one purely of economy; but we have thought it advisable to enumerate it here, were it for no other reason than to let the farmer see that, when studying theoretical agriculture, we do not forget that a process must be profitable before it can be advantageous. Were it not for this, the geologist might probably be loud in his praises of some plot of land of excellent qualities, but which was so stiff from an excess of clay, that it would require more labor and time to pulverize it, than could ever be recompensed even by the heaviest returns.

(6.) Soil for a good farm must either be naturally capable of letting off any superabundance of water, or it must be capable of being made to do so artificially by draining.

The immense advantages of draining have been far too fully treated of by many of those who have devoted themselves to the improvement of the soil to require any lengthened observations upon the subject here, because every farmer has already had his mind impressed with the importance of this process; and the disadvantages of an excess of water in soil have been so fully demonstrated as to require no additional proof in this place. It follows, therefore, if a soil be so situated as, on the one hand, to be exposed to the deteriorating effects of an excess of water, and, on the other, to offer insurmountable obstacles to drainage, this soil, however well constituted otherwise, is completely useless to the farmer, at least in the form of arable land.

(7.) Soil, to be useful to the cultivator, must possess a structure which will allow the decomposition of organic matter mingled with it to proceed at a regular rate, being neither so fast as to waste the manure nor so slow as to keep it too long fresh. In a practical point of view this deserves the greatest attention; and although the fact that sand may be too light and clay may be too heavy, has long been acknowledged by farmers, still science has taught us at least two valuable facts concerning this, viz., 1st. The cause of the fault in both instances; and, 2d, The means of, in a considerable degree, overcoming it, by suiting the manure to the texture of the soil; or, if this cannot be effected by employing means which will in some degree alter its texture. 1st, the cause of manure wasting upon very light lands depends upon organic matter being decomposed and converted into gaseous matter which escapes into the atmosphere by the joint action of air and moisture, and of this action becoming more rapid the more freely the organic matter is exposed to the air, provided it is at the same time supplied with a sufficient amount of moisture, without ever being *very wet*. Now, this is exactly the condition of manure in light sandy soils; the looseness of their texture admits of the freest circulation of air through their interstices, and at the same time allows all excess of water to flow through the soil during wet weather, while it facilitates the rising up of moisture from the constantly damp subsoil in time of drought; the result therefore is, that the manure is always freely exposed to air, is kept moist, and never allowed to remain long *very wet*. Thus, the very condition in which decomposition takes place with the greatest rapidity is constantly preserved and the manure in consequence yields its most valuable ingredients to the air, instead of to the roots of the plants, and every wind which blows over the surface of such a soil wafts away, for the benefit of the whole neighborhood, that which ought to have been limited in its influence to the spot to which it was applied. The very reverse of this is the case with stiff clay: here the access of the air is greatly impeded; in fact, unless such land is very well wrought, no air can pierce below its surface, except such as is dissolved in the water which falls upon it, and the escape of water is so much retarded that all substances contained under its surface are kept constantly *wet*. Manure, in this instance, is in the best condition to withstand decomposition, because, if thoroughly wetted, it is acted upon by the air dissolved in the water, but after that is exhausted no further change takes place except by very slow degrees. But a manure to be useful must be in a state of decomposition, for, until decomposed to a certain extent, it is of no value whatever to plants; the result, therefore, in this case is, that however much manure is given to the land, the greater quantity remains in a useless state, until, by the alternate drying and wetting of the soil by change of weather, its decomposition is at length effected. 2d, The practical value of a correct knowledge of the above facts is evidenced by its enabling us to correct the faults, in a certain degree, by a proper choice of manure; for example, in the case of very light lands the farmer should avoid using those manures which are most easily fermented and dissipated, and should employ in preference such as take a longer time to enter into decomposition, as, for instance, woollen rags, wool waste, &c., and the cooler kinds of excrement, preferring that of the cow and sheep to that of horses and pigs.

Again, if circumstances do not admit of so free a selection, he should apply his farm-yard dung in a much fresher condition than he would to his clay land, and as near the time of sowing as he conveniently can, because the more fermented it is previous to its application, and the longer it lies on the bare ground, the greater will be the amount of loss. The treatment of land of too stiff a texture is twofold. *First*, By selecting the most putrescent manures, and either having them well prepared before they are applied, or ploughing them in some time previous to the sowing of the seed; *Secondly*, Should circumstances permit, there are many cases in which, to a certain extent, a permanent cure can be effected, and the texture of the soil altered and rendered more open, by sufficient drainage, deep ploughing, and *paring and burning*.

We shall comment at large upon these under the fourth division, in which we purpose to consider the cures for many of the natural defects in soil.

(8.) The situation of soil must be such as to admit of all the operations of husbandry being performed in a proper manner, without occupying too much time; and the climate must permit of the plants arriving at perfection.

This is another purely practical observation, requiring no explanation further than to prove that in treating of a practical subject science must bind herself by laws to which she is in general a stranger. For example, were a chemist merely required to answer such a question as this, "Is the soil, of which the accompanying is a specimen, fit for cultivation?" he would analyze it, and finding all the requisites of a fertile soil, at once pronounce it well worthy of the attention of its possessor, whilst it might have been taken from the side of some hill far too steep to admit of horse labor, and exposed to a climate so bleak, that no crop could ever yield a profitable return. In this instance, a soil in itself excellent is rendered useless by external circumstances; but in order that the farmer may profit by the suggestions of the chemist, I need hardly remark, that *every* modifying condition, whether external or internal, must be carefully weighed before pronouncing a decided opinion.

(9.) In order that soil may be advantageously subjected to continued cropping, the farmer must keep up its essential qualities by ploughing, harrowing, and any other operations necessary to pulverize it. The value of the impalpable matter in soil has been already alluded to under (2), and we shall accordingly confine ourselves in this place to the enumeration of the practical advantages arising from a knowledge of the facts there brought forward.

The effect of ploughing, harrowing, &c., is twofold; 1st, it loosens the soil and renders it more porous; 2nd, it pulverizes it: both of these are of the greatest value; for while the first prepares the soil for a freer admission of air and moisture, the latter renders these capable of acting chemically upon the different ingredients contained beneath its surface. The necessity of pulverizing is evident, because, as far as plants are concerned, it is of little consequence whether their roots come in contact with an agglutinated mass of powder, or a stone; both are equally impenetrable, and hence both are equally useless; so that a soil badly pulverized is in many respects similar to a very stony soil, with one exception, viz., that the masses of matter which are capable of being reduced to powder, being more porous than stone, are capable of absorbing a greater quantity of the liquids contained in soil, and thereby impoverishing the land; it is therefore of the greatest consequence for the fertility of the soil, that it should from time to time be pulverized to the greatest extent of which it is capable, without the expenditure of *too great* a quantity of labor. All must be aware that Jethro Tull was so deeply impressed with the importance of this pulverizing of the soil, that he frequently affirmed that, if properly performed, it might altogether supersede the necessity of manuring. Of course this idea is extravagant, but still, as it resulted from practical experience, it tends to show in a forcible light the great value of the operation. In process of time, science may enable us to employ some more efficient method for increasing the quantity of impalpable matter in soil, in a shorter period than it can be effected by the gradual disintegration of the stones by the influence of the weather, and thus render the loosest sands capable of profitable cultivation.

(10.) Soil intended for continued cultivation must have its supply of organic matter, and part also of its mineral ingredients, renewed by returning to it, from time to time, in the shape of manure, what has been removed from it in the form of crops. We have already observed that physiologists are far from being at one in their ideas regarding the exact manner in which the organic matter of soil influences its vegetation, but still they all acknowledge the practical advantage of a good supply; many, however, suppose that the value of manures consists merely in their mineral ingredients, while others place all their value in one single element of their organic portions, namely, their azote. Be this as it may, we have still the fact acknowledged by all, that to keep up the productive power of a soil, it must be supplied with manure. Much practical advantage may be gained by studying carefully the relation subsisting between the composition of a soil, and that of the manure best suited for it, because it will invariably be found that that manure acts most beneficially which contains the best supply of whatever is deficient in quantity in the soil for which it is intended, and that much good material is constantly lost or rendered unprofitable by the absence of any attempt to accommodate the manure to the soil. When the researches of the chemist shall have enabled him to decide with accuracy as to the peculiar food best adapted for each crop, this accommodation will be capable of being carried to a much greater extent than it possibly can be at present.

(11.) But the *condition*, as well as the *composition*, of the manure must be attended to, because soil must have its activity preserved by adding to it, at certain periods, substances in a state of fermentation. Numerous facts tend to prove that the success of many crops depends upon the existence of fermenting matter in the soil, and that however rich it may be in other respects, these crops can only be advantageously cultivated after a fresh addition of manure; this is particularly the case with the turnip. Without dung the richest soil will bear but an indifferent crop; while with manure, very poor soil, if it be not too wet, will at all times give a good return. Science has not as yet been able to account for this satisfactorily, although many of her votaries are willing to acknowledge its truth, and it is obvious that an acquaintance with the fact must be of the greatest value in assisting the farmer in his arrangements, for he will of course apply dung when he intends to raise a crop requiring the existence of fermenting matter, and thus ensure its success while he

does no injury to the following crops, whose growth is, to a certain extent, less dependent on the condition of the soil.

4. It frequently happens that the farmer is not contented with his soil in its natural condition, on account of certain defects under which it labors, and which the recorded experience of his ancestors has informed him can be overcome or counteracted by certain processes which he may carry into effect with more or less facility, according to circumstances. The chief of these are draining, liming, and paring and burning; and our object in mentioning them here is to point out what is really effected by each, so that farmers may be prevented from misapplying them from ignorance of their peculiar mode of action.

LIMING.—To enter minutely into all the effects produced by the application of lime to soil, would require a separate essay. We will not attempt, therefore, any thing beyond a mere enumeration of the effects, and thence form a correct judgment of the cases to which it is applicable. Lime has three distinct great effects, in addition to several minor ones; 1st, it greatly hastens the decomposition of the organic matter in the soil, and in doing so renders it much more valuable to the crops; 2d, it alters the texture of the soil to a certain extent, proportioned to the quantity applied; 3d, it adds, of course, calcareous matter to the soil. From these considerations, it follows that lime is applicable to all cases where there is an accumulation of undecomposed vegetable matter, as in the poor old pasture, heath, peat-moss, moorland, and the like. But, on the other hand, lime is contra-indicated in two classes of soils, viz., in those which are poor, from the want of organic matter, and not from the want of care, as very poor moorland, thin shifting sands, &c.; and also in soils abounding naturally in chalk. A careful examination of the case should always be made prior to the application of lime, in order to ascertain whether it be judicious or otherwise, and likewise to determine the quantity likely to prove most useful; this should be regulated by the quantity of organic matter and of chalk in the soil, for the proportion of lime requisite will increase with the *increase* of the organic matter and the *decrease* of the chalk. The more organic matter, the more lime; the more chalk, the less lime will be requisite to produce the desired effect. It must, moreover, be remembered that, except in instances where there is a deficiency of calcareous matter in the soil, lime does not add directly to the fertility of the soil, but only increases it, by calling into activity what existed there before in a useless condition.

It follows, therefore, that however great the benefits of liming may be, it really exhausts the soil, and hence should not be *repeated* without great caution; indeed, we are convinced that few lands, except perhaps peaty soils, will profitably bear a repetition of severe liming. The practical advantage of being acquainted with the foregoing facts is obvious; without it, indeed, liming becomes a most hazardous operation, particularly to the landlord's interest; for many lands will yield, for a year or two, heavier crops, after a good liming, but afterwards the productive powers fall as much below the natural standard as they had been artificially raised above it. This observation, of course, applies only to such soils as either ought not to have been limed at all, or which, having been already subjected to the process, cannot bear its repetition without an ultimate loss.

In other soils, namely, those which are abundantly provided with undecayed vegetable matter, the good effected by the lime, in improving the texture, clearing the soil, and adding considerably to the impalpable matter, is far too great to be overbalanced by the diminution of the *absolute quantity* of organic matter in the soil, which is the necessary result of the increased rapidity of decomposition induced by its action.

(13.) In the application of lime to a soil, two things require especial attention, viz.:—1st, the condition of the lime; and 2d, its chemical constitution. 1st, a knowledge of the condition of the lime at the time of its application is most essential, because according to this depends in a great degree whether it be very beneficial or nearly effete. The utility of lime in effecting the decomposition of organic matter depends upon a chemical change which occurs during its transformation from *burnt* or *quick-lime* into *mild-lime* or *chalk*; it is necessary, therefore, that the lime and organic matter be in contact during the whole progress of this change. This may be effected in one or two ways; either shake the lime rapidly, spread it over the soil, and immediately afterwards plough it in; or make the lime into compost heaps, by digging a sufficient quantity of the surface soil to mix with the lime; turn it at intervals, mix the two thoroughly together, and after a few months spread the mixture carefully over the field, and then, as in the former instance, plough it in. The selection between these two plans must be regulated entirely by the particular circumstances of the place, the best time for driving the lime, condition of the soil as regards the crops it may be under, &c. 2d, As regards its chemical constitution, it must be remembered that there frequently exist, associated with the calcareous matter, other mineral ingredients which may exert a most baneful influence upon vegetation; and it is obvious that this would destroy altogether the utility of the process, even were all the circumstances in other respects most favorable. This can be determined at once by chemical analysis; and as the constitution of the rock seldom varies considerably in one deposite, a single analysis at the quarry would generally be sufficient for the whole time during which it was worked.

(14.) *Paring and burning.*—The immediate effects of this process are fourfold. 1st, It destroys a large quantity of organic matter. 2d, It alters entirely the texture of the portion to which the heat is directly applied. 3d, It reduces to a caustic state the alkalies and alkaline earths contained in the burnt portion; and 4th, By means of these alkalies it acts upon the remaining organic matter of the

soil exactly as lime does. To arrive at a just conclusion as to the true economical merits of this process, we must bear all these four facts in mind. 1st, As it destroys a large quantity of organic matter, it of course exhausts the soil to the extent of the quantity destroyed; this is, therefore, in one respect, a disadvantage. 2d, As it completely alters the texture of the portion burnt, viz., by giving to the clay the feeling and texture of the sand, we must consider how far this would be advantageous to the soil. 3d and 4th, As it produces alkali which acts upon the remaining organic matter of the soil, and thus further detracts from its supply of organic matter, it becomes of importance to decide whether the soil will bear the deterioration without a real loss of value. A careful comparison of the whole question leads to the following conclusions, viz:—that with the exception of the alternation of texture above alluded to, paring and burning act in a similar manner to (though in a much greater degree than) lime, and that economically considered, liming, when applicable, is in almost every instance preferable, because the same is effected with less loss. We should conclude, therefore, practically, 1st, that where lime is expensive, and the soil much injured by excess of undecayed woody fibre, paring and burning may be preferred. 2d, Where the soil is a stiff clay, containing a sufficiency of calcareous matter naturally to supply the demand of the crops, paring and burning would be the most advantageous. 3d. Upon sandy soil, not much overgrown with useless woody weeds, liming is far the best; or if the soil be already abundantly supplied with lime, then neither should be applied, but in their place wood ashes or kelp.

Thus much for the treatment of soil. We shall next examine,

II. *The effects of vegetation on soil*, or the various methods in which vegetation has been proved to affect the soil. Science has been enabled to explain satisfactorily the causes of the following well ascertained facts:—

5th, Concerning soil in its natural state:—

(15.) Uncultivated soil, however rich, becomes gradually less and less fertile until it has attained the condition either of moor or marsh.

(16.) Uncultivated soil retains its luxuriance for the greatest length of time, when covered with forest trees and other large vegetables.

(17.) Land not disturbed by the plough produces successive crops of different kinds; or, in other words, a sort of natural rotation is, to a certain extent, maintained.

(18.) On uncultivated land, when any species of plant disappears, its place is supplied by one of less value as an article of food, and thus the richest pasture comes in time to produce only the coarsest and most worthless species of grass.

(19.) Although the natural produce of uncultivated soil thus uniformly decreases in value, the soil itself becomes progressively richer; so that when brought under the plough, it will yield much larger returns than could be expected from its spontaneous produce.

6th, Concerning regularly cultivated soil:—

(20.) Soil continually ploughed yields its nourishment in much greater abundance, and with greater ease, to plants growing upon its surface.

(21.) The facility with which the productive power of *well* cultivated land diminishes, depends on its organized matter being more easily converted into compounds soluble in air and water.

(22.) The decrease of fertility in *carelessly* cultivated soil depends, in addition to the above circumstance, upon a diminution in the proportion of its impalpable matter.

(23.) Cultivated land, when properly taken care of, becomes gradually richer and richer, notwithstanding the increased quantity of produce annually removed from it.

(24.) If the same plant be cultivated for several years successively upon the same spot, the soil much more rapidly decreases in fertility than when a variety is kept up.

(25.) Some of the most valuable mineral constituents of soil decrease in greater rapidity in proportion to the greater care bestowed upon its cultivation, altogether independent of the portions removed by the crops.

Let us now proceed to the explanation of these facts.

(15.) Uncultivated land, however rich, becomes gradually less and less fertile, until it has attained the condition of moor or marsh. This, and several other of the facts related in the present section, are capable of being explained by reference to the important functions of azote in the vegetable economy, concerning which much has been ascertained during the last few years, and from which several general facts may be deduced, although, it must be confessed, we are yet very much in the dark respecting the fundamental or governing principles that regulate the facts in question.

Careful observation has proved the two following very important circumstances, viz., 1st, That the more azote any plant contains, the more dependent it is upon the soil for its support. 2d, That the value of any plant for food is, *cæteris paribus*, directly dependent upon its quantity of azote. Now, if we trace the history of any portion of soil, we shall find that it has gone through two distinct series of changes, which are exactly the reverse of each other. Let us suppose, for example, that several seeds of various kinds are scattered on the surface of a rock: those which contain much nitrogen will shoot up with the others, but long before arriving at perfection will wither and die for want of proper nourishment, so soon as they have exhausted the supply of azote originally contained in the seed; those seeds, on the contrary, which contain but little of this elementary principle are so independent of the soil, that they can attain a certain degree of perfection, and produce a few seeds even upon the surface of a barren rock.

When autumn is passed, vegetation for the year ceases, and all the plants wither, and during their decomposition become mingled

with a certain proportion of the constituents of the rock, which has become gradually disintegrated by the joint influence of their roots, and the moisture which they have retained about them. Thus a soil is produced. During the next spring the seeds remaining in the ground spring up, and more plentifully supplied with nourishment, a more luxuriant crop is produced. This continues to occur from year to year; and as there are several natural sources from which soil derives its nitrogen, independent of the vegetable matter decaying beneath its surface, as, for instance, from the rain which falls upon it, the soil becomes more and more capable of producing those plants containing greater quantities of azote, or in other words a tolerable rich pasture is the result. But no sooner has this occurred than a directly opposite series of changes commences; the soil has by this time become covered with a mass of root fibres, which mat it together and prevent the free circulation of air in its insterstices, and hence decomposition does not occur with sufficient rapidity to afford a supply of nourishment for highly azotized plants; these, therefore, die off, and as the evil increases annually, so the fertility of the soil decreases, until its surface is covered with those plants which are so far independent of the soil, that they can arrive at perfection although it continue in the state just described; or, in other words, the soil has now become moor or marsh according to its condition as respects water, for the only difference between the two is, that their herbage is regulated by the amount of dryness or moisture, those plants which require an abundant supply of water thriving so luxuriantly in the latter as to keep under all other kinds of vegetation.

The practical advantage of an acquaintance with the above fact is obvious, when we consider that upon a correct application of it must depend all the rational means of improving waste land, for as the fault lies in the condition of the soil itself, no surface application can be of permanent advantage.

(16.) Uncultivated soil retains its luxuriance for the greatest length of time when covered with forest trees and other large vegetables.

This also depends upon an analogous cause. The proportion of nitrogen in woods is very much less than in any of the herbaceous plants employed as food, and hence it follows that they are more independent of the soil as far as regards organic matter. But in addition to this, large trees act upon a much larger portion of the soil; for whereas, in pasture land, few, if any, root-fibres extend more than six or eight inches below the surface; in forests of long standing it is almost impossible to state accurately the extent to which their roots penetrate, for if the subsoil be porous, they will travel to great distances in every direction. Again, the long duration of each individual plant is a great cause of the fertility being preserved, because, as the root-fibres are continually lengthening at their extremities, the tree is constantly coming in contact with new portions of soil; whereas if one dies, and is replaced by another at short intervals, the new roots have to traverse the same spots which have been visited, and partially exhausted, by a former generation. These three reasons are abundantly sufficient to account for the luxuriance of natural forests being preserved for so much greater a period than that of natural meadows.

(17.) Land not disturbed by the plough produces successive crops of different kinds, or, in other words, a kind of natural rotation is, to a certain extent, maintained. This is a most interesting fact; and although as yet our acquaintance with it is but limited, still the examples deduced to prove its truth are well worthy of attention, and should lead us to examine more minutely into the herbage of natural meadows to ascertain the extent of this change of crop. The most decided instance which has hitherto been published, is the following, which is related in M. Liebig's valuable work on the application of chemistry to agriculture. The author observes, that barren spots gradually appear in fields bearing only one kind of plants, but if "such a field be observed for several years, it is seen that the barren spots are again covered with vegetation, whilst new spots become bare and apparently unfruitful, and so on alternately."

But if we examine a portion of ground which bears several different species of plants, we shall find that some are continually disappearing, and other new ones supplying their places, or some of those already existing growing up in far greater abundance. Thus, for instance, in all natural meadows, white clover and the finer kinds of grasses disappear, and are replaced by those of coarser growth; but if anything occurs to prevent these from completely overgrowing the soil, the clover and other grasses will re-appear after a short interval, again to be lost sight of in a few years. The knowledge of this is valuable, as proving to us that the necessity for a rotation of crops does not depend upon the plants being in a somewhat unnatural state from the effects of cultivation, but that it is requisite for all plants even in a state of nature, except perhaps those comparatively useless grasses which constitute the bulk of the vegetation in all neglected spots. It is very desirable that more extended observations should be made on this point, for an acquaintance with the order in which plants succeed each other naturally would assist greatly in the construction of a more perfect rotation than any hitherto suggested. In the meanwhile we think enough has been learned to prove the truth of the statement, but by no means sufficient to enable us to draw any practical conclusions therefrom.

(18.) On uncultivated land, when one species of plant disappears, its place is supplied by one of less value as an article of food, and thus the richest pasture comes in time to bear only the coarsest and most useless species of grass. This may be considered almost as corollary upon the above, as it evidently depends upon precisely the same cause.

When a flowering plant is growing in a state of nature, it annually sheds its seeds in the immediate neighborhood, and consequently

(in the case of an annual) its place is filled the next year by all the produce of the seed, and the result is, that in a few years a large space of ground is occupied by the succeeding generations of one original plant; or should it be a perennial, much the same occurs, with the exception of the old plant continuing and checking the luxuriance of those seeds which fall on the spots already pre-occupied.

But when the soil becomes exhausted of the food best suited to the growth of this plant, it matters not how many seed may be shed upon it; they will all either die or remain inactive, until stimulated by the presence of their favorite nourishment. When, however, soil is thus unfitted for the growth of one plant, it by no means follows that it is equally so for all; and, accordingly, some other seed which has accidentally fallen on the spot, springs up, flowers, produces seed, and the whole series of phenomena again takes place. Now, the following circumstance, connected with the influence of azote upon vegetation regulates the order in which the various herbs and grasses succeed each other. The more azote a plant contains, the more dependent it is upon the condition of the soil, and at the same time the more valuable it is for food.

These, therefore, are the first occupants of a lux uriant plot of ground. As the fertility of the soil diminishes, these gradually disappear, and are replaced by others less dependent upon the soil; or, in other words, containing less azote, and hence less valuable as food, and so forth, until at last the ground produces nothing beyond the coarse herbage of the moor or marsh.

(19.) Although the natural produce of uncultivated soil thus uniformly decreases in value, the soil itself becomes progressively richer, so that when brought under the plough it will yield much larger returns than could be expected from its spontaneous produce. This statement may appear somewhat strange to those who have attended solely to the theory of agriculture; while to the practical farmer, however inexplicable it may be, still he is too well acquainted with the facts to doubt for one instant its truth. Careful investigation removes the difficulty at once. The chief reason why the produce of uncultivated soil becomes continually less luxuriant, depends upon the soil remaining undisturbed, and in consequence of this becoming consolidated to such a degree that it assumes, for the time, some of the conditions of stiff clay, being nearly impervious to air, and losing the benefit of much of its impalpable matter by its becoming agglutinated. The result of this is, that the decomposition of the organic matter of the soil either ceases altogether or progresses at an extremely slow rate. But plants obtain the elements of which their organic matter is composed from the air as well as the soil; the herbage therefore, of land, in the condition just described, increases chiefly at the expense of the atmospheric supply of nourishment, and thus when it decays a *new* quantity of organic matter is added to the soil, and from the slowness of decomposition occurring therein, it gradually accumulates from year to year, so that when brought into cultivation, such soil will be found possessed of a much greater quantity of organic matter than it originally contained. A knowledge of this fact is of course useful, as it supplies us with a method of increasing the organic matter of soil, without the expense of adding manure to it; and although the crops produced in the mean time are undoubtedly inferior, still there are many situations in which this plan is by far the most economical. When, therefore, soil is losing its value from over-cropping, nothing more is necessary to reclaim such land than to lay it down in grass for a few years· and as the grass will of course be pastured by stock, the decrease of produce which generally occurs from year to year is fully compensated for by the droppings of the cattle, which increase the fertility of the soil so rapidly that the desired effect is in this manner produced some years sooner than could otherwise be the case.

8th, Concerning regularly cultivated soil:—

(20.) Soil continually ploughed yields its nourishment in much greater abundance, and with greater ease to plants growing upon its surface.

This is one of the chief causes of the greater luxuriance of well-farmed land, as compared to that of the same texture, and under the same climate, which is carelessly attended to. There are two things which constitute the chief business of every good farmer; 1st, he must keep his soil in the condition in which its natural fertilizing powers are brought most fully and freely into exercise; and 2d, he must as far as possible increase their power. Now, continually repeated ploughing and harrowing has this effect, by producing, as already shown (9) the greatest amount of impalpable matter, and likewise insuring the free circulation of air; and we have likewise shown (7) that the greater porosity of a soil, the greater the rapidity of decomposition of organic matter. Now, the practical benefit of being acquainted with this circumstance is, that the farmer may be led to bear in mind that the processes employed by him to increase his crops, have of necessity the effect of impoverishing his soil with greater rapidity than would have been the case had the land remained unemployed; and consequently the more he removes annually, in the form of crop, the more he must add in the shape of manure.

(21.) The facility with which the productive power of *well* cultivated land is diminished, depends upon the fact of its organic matter being more easily converted into compounds soluble in air and water. This has been already explained under (7) and (20,) and therefore requires no further observation here.

(22.) The decrease of fertility in *carelessly* cultivated land, depends, in addition to the above circumstance, upon a diminution in the proportion of its impalpaple matter. This is owing to a want of sufficient care in working the land so as to effect its pulverization, and likewise to allowing the old roots to remain in the soil, and thus permitting it to become foul. When a soil is foul, the old roots

bind large portions of the impalpable matter together, producing, as has been already explained, masses which are of as little value as if they were stones, until something has been done to break them down. Thorough cleaning of the land by ploughing, harrowing and grubbing, is all that is required in this case to restore the soil to its original fertility, but without this no quantity of manure will enable it to bring its full powers into action.

(23.) Cultivated land, when *properly taken care of*, becomes gradually richer, notwithstanding the increased quantity of produce annually removed from it. This depends upon the same general principle as the gradually increasing richness of uncultivated land, viz., the quantity of organic matter annually produced by elements obtained from the atmosphere, so that every vegetating field is continually engaged in bringing down and depositing in the soil what was floating about in the form of gas. A number of calculations have been made to prove what the above fact demonstrates, that soil yields no organic matter whatever to plants; but all these are founded upon a basis altogether erroneous. They state, what is no doubt true, that as part of the produce is annually exported from the farm, and a still greater part consumed and converted into beef and mutton, the quantity of organic matter added to soil can never equal that removed from it, unless manure be imported; and therefore, if cultivated soil becomes richer in organic matter, it proves that it has yielded *nothing* of this to the crops. There is obviously, however, a mistake here, because all it proves is, that the manure and the atmospheric supply *together*, equal more than the whole weight of the crop; which the most accurate calculations will prove to be the case.

(24.) If the same plant be cultivated for several years successively upon the same spot, the soil much more rapidly decreases in fertility than when a variety is kept up. In treating of the kind of natural rotation which occurs upon uncultivated land, we stated that soil became unfitted for a continuance of the same plant, long before it was incapable of bearing others. The exact cause of this is still somewhat involved in obscurity, owing to the imperfect state of our knowledge respecting the precise form in which plants receive their nourishment; nevertheless, as far as our knowledge extends at present, we may state, that the chief reason of the rapid decrease of fertility of soil continually cropped with the same grain, appears to be, that as different plants require their food in different conditions, while the same plant always requires the same elementary substances, both organic and inorganic, to be supplied to it; so, if the same plant is continually cultivated upon one spot of ground, too great a demand is made for some particular ingredient, and the crop begins to fail as soon as this becomes deficient in quantity.

If, on the contrary, a judiciusly selected variety be kept up, the result is, that each succeeding crop makes use of that which the former did not require, and thus all the various nutritive principles are equally turned to good account.

(25.) Some of the most valuable mineral constituents of soil decrease in greater rapidity in proportion to the greater care bestowed upon its cultivation, altogether independent of the proportions removed by the crops. It is of considerable importance that this fact should be borne in mind. We think that far too little attention is in general paid to the *natural tax* (if we may be allowed the expression) which is laid upon all cultivated land. What we refer to is, that the operations performed on soil to enable it to produce heavier crops, have at the same time the effect of rendering the soil more easily deteriorated by natural agents; so that the same means which enable the plants to obtain with greater ease a larger supply of nourishment, increase also the continual waste which occurs by the escape of valuable matter in solution in air and moisture. The particular substances referred to under this head are the alkalies and alkaline earth, whose great value in all soil is quite undeniable.

Now, we have already seen that ploughing and harrowing have two effects, 1st, of loosening the texture of the soil; and 2dly, of pulverizing it. When rain-water falls upon soil, it always contains a considerable quantity of carbonic acid dissolved in it, which acid has the power of dissolving a certain definite quantity of lime; now, the looser the texture of the soil, the more readily the rain flows through it; and hence it follows that the more a soil is ploughed and harrowed, the greater will be the quantity of lime annually carried off by the rain-water which finds its way into the drains. Again, it is a beautiful provision of nature, for the purpose of preventing all soil from becoming soon barren owing to the waste of alkalies in it, that no alkali, however soluble in water when pure, can be dissolved in water when associated with the various ingredients constituting rocks and stones, until these are reduced to impalpable powder; but when they assume this form the first rain that falls is sufficient to wash it away, unless it has entered into some chemical combination which is less easily dissolved. The result here, therefore, is precisely the same as above; the more you pulverize a soil, the more alkali will be annually removed by the rain-water.

The practical advantage of knowing this is, that it will serve to remind the farmer of the waste of valuable material which is constantly occurring in his best soil, and hence prove to him the necessity of renewing these from time to time, should his crops give indications of a deficiency.

JERUSALEM ARTICHOKE.

(HELIANTHUS TUBEROSUS.)

From the fact, that many inquiries have been made of late in relation to this very remarkable and useful plant, I am disposed to

speak a few things of its culture and uses. The Jerusalem artichoke is a native of the warmer parts of America, and of course was unknown in Europe till after the discoveries in this country by Columbus and his coadjutors. Since that time it has been cultivated to considerable extent on the continent as well as in Great Britain, but the reports of its profits have considerably varied, in that, as well as this country. In the old world some have cultivated it to afford shade to the game; others have converted the stocks and leaves into fodder for cattle, and others again have encouraged its growth for the tubers alone. In this country there are two important objects to be kept in mind in raising artichokes. 1st. The improvement of land; 2dly, The use of the tubers. However, the first matter is the cultivation, and I begin with

1. Soil. Almost any kind of land will produce artichokes, and it is remarkable, that they will grow in the shade, that is, under trees, or in fence corners, very well indeed. Land, however, with a tolerably good sandy mould will give the most abundant crop. Low, wet soil, and very tenacious clay, are not so suitable.

2. Preparation of land. The ground should be broken as for corn, that is to say, one good, deep ploughing, and a thorough harrowing, will answer the purpose admirably.

3. Laying out. Rows laid off four feet each way with a bull's tongue or shovel plough, in most soils, will be the proper distance.

4. Quantity of seed. From four to five bushels will be required to the acre, and unless the long roots are broken to pieces of three or four joints, or eyes each, this quantity will not be enough.

5. Manner of planting. Drop one root at each cross of the plough, and cover from one to two or three inches with a harrow, hoe, or plough.

6. Cultivation. So soon as the young plants appear, run round them, with a cultivator, harrow or light plough to destroy the young weeds, and loosen the earth. Keep the ground free of weeds and open to the influence of the atmosphere, till the plants are about three feet high, when they should be laid by, by the use of a cultivator; or, in the absence of a cultivator, and when the land has been ploughed, the harrow should pass both ways to leave the ground loose and the surface level. Generally, about the same cultivation given to corn will answer well for artichokes.

7. Digging. This is the most troublesome job in the management of this crop; and if the hoe is the dependence, the labor will be very tedious. The better plan is to lay off a land as for breaking up the ground, so soon as the frost has killed the under leaves of the stocks. The plough should run from six to nine inches deep, and let the hands, big and little, pass directly after the plough, to pick up, that none of the roots may be covered by the next furrow.

8. Yield. The produce to the acre is variously estimated from 500 to 1000 bushels, and it is probable the turn out on medium land would be nearer the latter than the former.

9. Uses. In England and other parts of Europe, the tubers have been considered quite a delicacy for man, and, without doubt, they make the most beautiful pickle. But their chief importance, in this respect, is their use in feeding hogs. From the middle of October to the middle of November, the hogs may be turned on the artichokes, and with salt always in troughs to which they can have access, they will grow and thrive till next spring, particularly if the ground is not too hard for rooting. I have not experimented to ascertain the quantity of hogs to the acre of good artichokes; but, from the observation of two seasons, I am of the opinion, 20 head will do well on an acre for four months. As some have complained their hogs would not root after them, it may be necessary, as hogs, like men, know not much before learning, that they be taught to root after them. This is done, by calling the hogs after a plough that will throw out the roots, till the grunters learn their habitation, which will require a very short time.

10. Improvement of land. As the stocks grow from ten to fifteen feet in height, and have thick, porous foliage, much of the food of the plant is received from the atmosphere, and thereby the soil is not so heavily taxed as by other crops, the ground is protected from the killing rays of the sun, and the stocks and leaves fall and rot very soon—these advantages, with the manure from hogs, afford the cheapest, and amongst the richest coats in my knowledge. It is my conviction, (in the absence of long experience,) that artichokes in summer, and hogs in winter, will enrich our poor land cheaper and much better than upon any other plan. To be sure, a farmer cannot have all his land in artichokes, but every one should have enough to support his hogs through the winter, and I venture those who give this crop a fair trial, will reluctantly abandon it.

11. General remarks.—A few farmers of my acquaintance have informed me, that they have succeeded with corn and artichokes together, and it is highly probable this will prove a successful mode of cultivating these two crops; but on the system of "one thing at a time," we would prefer each crop separately. Some have supposed the second year's growth on the same ground would be more valuable than the first, but this is a mistake. The plants grow so thick the second year, that not more than half a crop can be anticipated. It might answer, to plough out rows and cultivate the second year; but the practice of putting artichoke lands in something else the second year, is the plan I much prefer.

Amongst the arguments which might be used in favor of this crop, it should not be forgotten, that there is no labor of digging, but for seed; that more troublesome weeds and grasses are completely smothered out; and last, but not least, the young plants the second year are more easily subdued than almost any weeds known. Take artichokes all in all, I think them worthy the attention of every farmer who wishes to enrich his lands, or raise his pork with a small outlay of grain.

T. F.

Agriculturist.

EFFECTS OF CHARCOAL ON VEGETATION.

Some of the gardeners and scientific men of Germany, have within a few years interested themselves in a series of experiments upon this subject, conducted at the royal botanic gardens of Munich, by Edward Lucas, of Erfurt, assistant gardener. The results are highly curious, and may probably be turned to good account by cultivators in this country. Professor Zuccarini, of Munich, mentions that by the use of charcoal, shoots of plants, leaves, parts of leaves, calyces, &c., may be made to grow, even of plants that seldom or never make roots in the usual way of treatment.

He states that Lucas, in the spring of 1839, discovered that several plants in a hot-house that were plunged in refuse of charcoal, showed an extraordinary vigor of growth, as soon as they had pushed their roots through the holes in the bottom of the pots, into this under stratum. This observation led to a set of experiments, which quite astonished himself and the scientific friends who encouraged him to prosecute them.

He at first used the refuse of charcoal, too fine to be burnt, from which he sifted the coarser pieces by a coarse earth sieve. He found that to answer best which had been exposed for some months to the influence of the air and weather. In such charcoal, unmixed with any other material, he succeeded the first season in getting cuttings of many plants to grow; he names sixty-six kinds; among them, euphorbias, begonias, cacti, and other succulent plants, black pepper and the bread fruit. The unsuccessful experiments were few, compared with the successful. From parts of leaves, he succeeded in getting a considerable variety of plants to vegetate; he enumerates twenty-nine, including a species of euphorbia, two of begonia, and the sweet potato. All the species of gloxinia grew, even from a flower stem, or a calyx. A species of pine *(Pinus excelsa,)* grew from the leaves.

He then mixed various kinds of earth with the charcoal, and still had the most extraordinary results. He says that all the plants he subjected to this treatment, were as much distinguished by their luxuriance, as by the more perfect developement of their individual parts. This was particularly the case with tuberous rooted plants, which besides their perfect developement, had also a much longer period of vegetation; so that the difference in this respect, between those that were cultivated in their usual soil, and those which had a mixture of charcoal, amounted to nearly two months. Orange trees with yellow leaves, having had a layer of charcoal laid on after the upper surface of earth had been removed, soon recovered their green color; this was also the case with some other plants. He was not very particular as to the proportion of earth he mixed with charcoal, but generally found half of each to do very well, always taking care that the coal had been exposed for some time to the weather, and that timely watering was never neglected, as the porosity of the earth causes it to dry quickly. An old and sickly plant of the doryanthes excelsa, which had been declining for two years, and had no roots left but one old and decayed one, was planted in one third charcoal. In three weeks it began to grow, and finally recovered perfectly.

Lucas, in an essay written within a year, mentions that many gardeners not having succeeded in their experiments, charcoal had fallen into disrepute among them; but he believes that in every case the failure was owing to the manner of applying it, or to the quality of the coal itself. He has found that in many cases, particularly when used in pots, as soon as the capillary vessels of the charcoal are full, a further supply of water is useless and injurious; when mixed with soil, however, it requires more frequent watering. But the chief cause of failure was the fineness of the charcoal, by which its most valuable qualities, capillarity, capability of condensing gases, and porosity, were lost.

Many new plants, of which he names seventy-two, some very difficult sorts to root, had grown in charcoal, since his last published essay. He mentions four kinds of magnolia, a myrtle, Canada pine, Indian azalea, an erica, the *tendrils of a grape*, the oleander, and two kinds of medicinal guaiacum. Among the plants he names, are species of the most opposite families, and most of them rooted much easier than in sand or earth; with some, no trial of the usual methods of propagating had before been successful at the botanic gardens of Munich. He had not made much use of charcoal in sowing seeds, but when applied, it had proved very efficacious. He had made experiments upon the fitness of charcoal for packing plants for transportation; and for this purpose some young chamœdoreas, ferns, calceolarias, salvias, verbenas and young cabbage and cucumber plants, some with moss round the roots, others without any covering, were put in dry or very slightly moistened charcoal, firmly pressed down, and the closed box placed for four weeks in an airy shed, on which the sun shone for several hours; at the expiration of this period, the palms and ferns were found in a very fresh state; the calceolarias and salvias had some yellow leaves, but had made young shoots; a species of petunia, even flowered on the box being opened; the verbenas only had suffered, but were still alive; the young cabbage and cucumber plants taken out of dung beds had rotted, but without injuring any of the plants lying beside them; cut flowers of many different sorts, kept perfectly fresh in pure dry charcoal, from eight to fourteen days. Radishes, parsnips, onions, and the turnip-like roots of oxalis lasiandra, *Zucc.*, attained a considerable size in a bed filled one foot deep with pure charcoal; the roots of tulips, which had produced flowers in the spring, being planted in the same bed, flowered again, perfectly well, late in the autumn.

To prove if any difference existed with respect to the efficacy of different sorts of charcoal, the garden inspector, M. Seitz, had charcoal made from eight kinds of wood, viz: oak, linden, ash, beech, alder, willow, elm and fir.

They were found to have almost exactly similar effects. It was very different with animal charcoal, which in this experiment, produced the most favorable results; many leaves rooted in them which had not succeeded in the wood charcoal, and some very soon produced shoots.

Zuccarini says that those leaves were found to vegetate most freely, which had strong prominent veins. The cut ends of these being placed in the chorcoal, a small tuber or callosity formed upon the extremity of each. These attained the size of a large pea before putting out roots, and from them proceeded the germ, or shoot, which formed the new plant; each vein thus producing a separate plant. He found it of advantage, as soon as the growth of the tuber was sufficiently advanced, to remove the cutting from the coal into a proper sort of mould, and, by this means, the little knob being able to provide its own nourishment, will prevent the untimely exhaustion of the parent leaf. If this precaution is delayed, an entire stoppage takes place in the growth; the knob produces neither roots nor buds, and dies; because the parent leaf cannot yield any more nourishment; and the charcoal appears to him to have a preserving and stimulating, rather than a nourishing quality.

W. Neubert, of Tubingen, discovers, however, that by the use of charcoal, plants thrive permanently in much smaller pots than heretofore. He had primulas, eight years old, with stems a foot and a half high, growing and blooming luxuriantly in pots of two inches diameter. He transplants them every autumn, and takes away half the ball of roots and all the side shoots, and is careful to keep them tolerably moist. He finds his plants (quite the reverse of Lucas' experience,) produced much fewer roots than usual, and conjectures that this may be owing to his having used beech coal instead of fir, as Lucas did.

Dr. Buckner undertakes to explain upon scientific principles, the wonderful effects of charcoal. He ascribes them in part to the power possessed by that substance of absorbing light and heat to a very great degree, in consequence of its dark color and extreme porosity; and also to its capacity for absorbing atmospheric air. Among all the bodies capable of absorbing gases and vapors, charcoal has been proved by numerous experiments, to hold the first rank. Consequently, when long exposed to atmospheric action, it imbibes many qualities highly conducive to vigorous vegetation, and is the means of conveying to the roots of plants, besides light and heat, nitrogen, hydrogen and oxygen, in great abundance.

He remarks that for a long time it was generally supposed that charcoal, as an inanimate body, incapable of decay, contributed, in no degree, to the nourishment of plants, and that charcoal dust could only serve, at most, to make the earth looser and warmer. But Lucas found that the charcoal in which plants grew, by degrees underwent decomposition.

Judging from the effects of charcoal on vegetation, its antiseptic properties are of great importance. It has very little power of retaining water; and this property deserves great attention, in respect to recovering the health of plants which have been injured by being in a clayey soil, or too freely watered, or after continued rain, or being in contact with manure not sufficiently decomposed.

Lucas has not confined his experiments to coal. He has for six years been making use of *snow* in the germination of certain kinds of seeds, chiefly those of alpine plants. He first put into pots a portion of earth, the most suitable to the kind of plant to be cultivated; then a layer of snow, then the seed, and covered it with another layer of snow. He then set them in a box covered with glass, and placed it in a temperature of 59° to 60° Fah., in which the snow melted. Many of the seeds germinated in two days. He even succeeded with the purple crotalaria, which he had never done before by any other method. After germination, he sprinkles a little sand over the seed.

Professor I. Leibig, of Giessen, who has devoted so much learned research to agricultural chemistry, is of opinion, "that the loose formation of the snow, which allows of an uninterrupted admission of oxygen; the exclusion of those foreign agents which are always found in a soil that contains corrupted vegetable matter; and finally, the volatile alkali of the snow,—all these causes combined, effect the remarkable appearance of germination in this process.—*From the Friend.*

PRACTICAL FARMING.

WHEATSHEAF FARM.

We recently made a visit to the farm of W. A Seeley, Esq., of Staten Island. The buildings are in a style of entire plainness and simplicity, yet with perfect adaptation to the object in view. A large and well constructed windmill, of the most substantial kind, occupies one of the group of farm buildings, which is used during a great part of the year in grinding for this and the neighboring farms. But the peculiar merits of the outbuildings consist in the barns. There are two of them, of large size, and so constructed as to afford the greatest quantity of available room. They are both built upon a side hill, thus enabling the loaded hay and grain to be drawn in upon a level with the upper side, and the entire floor is appropriated to their occupancy, while at the same time that it affords a great abundance of convenient room, saves the trouble of pitching it high, and furnishes the fodder just where it is wanted to feed into the racks for the stock below. The underground room of one is divided into stalls for horses on either side through its entire range, one hundred and thirty feet, and a large gangway, accessible by folding doors at each end, runs through the centre, affording ample room for carts or wagons for the purpose of removing the manure. Water is admitted at one end through a stop-cock from a pond above, forming a reservoir from the drains. Commodious yards adjoining, afford space for exercising the ani-

mals. This barn is expressly designed for stabling supernumerary horses from this city through the winter, yet its construction admits of its being used to equal advantage for any other stock. The other barn being designed for cattle and sheep, is open on the south, and the other three sides are occupied with racks for the stock, which are divided, when necessary, by partitions and enclosures.

But the particular advantage of these barns consists in the admirable contrivance afforded for the accumulation and economical preservation of the manure. Under shelter from the washing rains and exhausting sun, well mixed with earthy and vegetable matter, it is here retained till it can be advantageously applied to the land. Between, and contiguous to the barns, is a tank capable of holding twenty-five thousand gallons, which is the receptacle of those enriching liquids of the farm yard, without the retention and careful application of which, to the growing crops or stercorated heap, no farming arrangement can be deemed complete. An outlet near the top conducts off the surplus liquid to a heap of compost, if it rises too high before required for use, by which it is absorbed. At all other times the cistern is emptied by sheet iron buckets attached to a revolving iron chain, and propelled either by the windmill, or, if necessary, by horse-power, the shaft geering into either as required.

No particle of animal or vegetable manure produced upon the farm is allowed to be wasted. All is preserved and added to the general stock of compost. The necessity of resorting to the city for manure at a large expense, is here shown to be unnecessary, and those who at first jeered at this undertaking, are now wisely following the example. Since the full organization of the farm, there has never been less than two thousand loads of surplus manure ready for use.

A small patch of the stiffest and most unpromising clay, from which, Mr. S. says, his first attempt for a crop of buckwheat resulted in a growth of about six inches; by an addition of a coating of sand ploughed in, and a subsequent one harrowed over the surface, produced a most bountiful yield. It is thus the intelligent and observing book farmer avails himself of all the principles of science and the experience of others, in his practice, and the consequence is, he gets rich, while his equally industrious and economical, but ignorant neighbor continues poor.—*American Agriculturist.*

STABLES—LITTER, &c.

Derby, December 27, 1842.

Mr. Editor,—The chief business of the farmer, through the long winter months now at hand, will be the care and attention of his stock; and we hope that every careful and judicious farmer will have provided himself with convenient sheds and stables, for the comfort and health of his animals through the cold winter months. "A merciful man is merciful to his beasts," and any farmer who will neglect and starve his animals at this season, is not worthy the name of a farmer.

Stalls for cattle should be kept warm, and well ventilated, and should be cleaned every morning after the cattle are turned out. Another important point is, to have your stalls well littered with straw, cut from three to four inches in length; and as rye straw is mostly used by us for litter, in Connecticut,—we hope that no farmer, after trial, will think of littering his stables with long straw, without being cut up.

When a large quantity of straw is thrown into the hog pen, to be mixed with rich loam, or muck, it should be cut up, and then the swine will work the whole mass together, and in the spring you can fork it out easy, without pulling or tearing, as in the case when whole straw is put in.

Last winter, being short for straw, we went to the woods, and carted home leaves with which we littered our stables. It made a soft bed for our cattle to lie upon, and, when thrown out, it made good manure for any kind of crop.

It is a good plan, where manure is thrown out into a heap, to spread it about the yard; as when it is left in a heap till spring, it is apt to heat and mould; and this is the case in particular with horse manure.

Every farmer knows, that manure kept under shelter is worth about double that which is left out, to be washed by the rains, and undergo the action of freezing and thawing. This being the case, it will be well in constructing barns, either to have a barn cellar for the manure, or, where this is not convenient, let the stables be made wide enough to throw the manure back in a space of sufficient width to back in a cart, and carry out the manure in the spring.

The practice of stacking out hay about the farm, has justly been condemned by all good farmers. It is calculated, in stacking out hay, to be fed to cattle, from a quarter to a third of the hay is wasted, and besides that, the loss of manure, the leanness and suffering of the cattle, from cold and exposure, and the time spent in foddering them makes it all a bad business from beginning to end. We will suppose a farmer, in a cold winter's morning, after a driving snow storm, to set out for a distant stack on his farm, to fodder his cattle, and, after beating his way through the snow for half an hour, he at last arrives at the hay stack. But what a picture presents itself, there stand his cattle, by the side of a rail fence, their only shelter, with their hind feet drawn up so near their fore ones, that they can stand on the bigness of a shingle, shivering and shaking with cold. If this will not stir up the feelings of a man, then I know not what will, especially if he be a man of nervous temperament. If any reader of the Gazette should be in this predicament, the present winter, we hope they will make up their minds, that before another winter comes, they will provide good sheds and stables for all their stock.

If you are under the necessity of stacking out part of your hay, then bring it up and stack it around your barn-yard, where you can take it to your cattle in their sheds and

stables. But what is better than all, provide yourself with extra barn room and stabling for all your hay and cattle. It will pay you ten per cent. on the capital laid out, in the saving of hay and manure, and the comfort, good order, and health of your animals.

And now, brother farmers, as the year is about drawing to a close, let us not forget to return our sincere thanks to the great Giver of all good, from whence all our blessings come, that has not only spared our unprofitable lives, but that He has crowned our labors with success; that he has filled our barns and store houses with plenty of food for both man and beast, and that He has brought peace, comfort and happiness to our houses and our fire-sides.

L. DURAND.

Farmers' Gazette.

THE ORCHARD.

It is in the power of every one, in possession of a very small plat of ground, to have most delicious fruit. It astonishes us very much indeed, that all farmers and gardeners do not plant fruit trees, when it is known they will bear so early, require but little land—nothing pays better for the labor; besides fruit is not only delicious to the taste, but, when fully ripe, contributes both to health and the comforts of every family. Believing there is a disposition generallv to pay more attention to this subject, we will give some concise directions which will be useful if put in practice.

1. *Soil and situation.*—Almost any of the lands of the west will grow fruit trees, but some qualities are far preferable to others. A rich, sandy loam is the best, and the worst perhaps is land with a thin layer of earth, and a limestone substratum. On the latter, trees may grow fast and flourish a few years, but they cannot last long. Stiff clay is not good, unless lime or ashes and sand be put about the roots. A northern exposure, in southern latitudes, is thought best for every kind of trees. The advantage is in being later in putting out in the spring, and of course there is less danger of the fruit being killed by the frost. A very high hill is a suitable location, and some kinds of fruit trees—the peach for instance, does admirably well by the water side.

2. *Time of transplanting.*—In reference to the best season of putting out fruit trees, there is but little agreement amongst the most scientific and experienced. Success has attended both autumn and spring setting out; but our own prejudices and reason are strong in favor of the spring. We scarcely ever lost trees transplanted in the spring. Evergreens particularly must be put out in the growing stage or nine times out of ten they will die. It is scarcely presumable trees take up nourishment to any considerable extent where there is no circulation of sap; but if they are put out in the fall, they may lose some from the buried and severed roots, and all persons know trees put out in the winter are quite liable to be injured by the winds. The greatest advantage of fall planting is, perhaps, that it is not so busy a season as the spring. Trees planted before March, should always be tied to a strong stake.

3 *Kinds of trees.*—By all means good varieties of trees should be obtained. It must be mortifying to the farmer or gardener, after being at the trouble of putting out an orchard, and waiting from four to ten years, and then find his trees bear little, knotty, bitter and sickly fruit, which is too often the case in the west. Good trees require no more labor or land than indifferent ones, and while the latter are a nuisance to the ground, the former yield a handsome income. As it is not convenient or practicable for every one to raise his own trees, application should be made to a nursery-man who can be depended upon. Neither peaches, pears, nor apples can be depended upon from seed—indeed no other kind of fruit unless it grows entirely alone. But unless the farmer has an opportunity of selecting the best kinds, and understands grafting and budding, he will find it to his interest to purchase, if he have to send hundreds of miles for the trees.

4. *Distances.*—If the farmer has plenty of land, most kinds of trees might be put forty feet asunder, so that the land could be cultivated. But under no circumstances should apple, pear or peach trees be put under twenty-five feet. If they have plenty of room, the air can circulate more freely, and the land can bear the cultivation most essential to the growth of the trees.

5. *Mode of putting out trees.*—Lay out the rows as desired, then dig pits three feet in diameter and eighteen inches deep. Have some good mould from the woods, or any well rotted manure, with about half a shovel of slaked lime or old ashes thrown by each pit. Mix the ashes and manure thoroughly and sprinkle one shovel in the bottom of the pit. Then put in the tree and spread all the fibrous roots at full length. Next to the roots sprinkle a few shovels of the surface soil; then put in the balance of the compost, and press all lightly with the foot on the roots. Then fill the pit with the balance of the soil and clay that had been thrown out, and press it gently down with the foot. It is important the pit should be full to prevent the water accumulating and settling about the roots and thus causing death. Great care should also be taken that the trees are not inserted too deep. The tree never grows much, if any, till the small fibres near the surface begin to run, and if the tree is so deeply inserted that these have to come fresh from the stock, the growth will be retarded, and the stock will run considerable risk of being destroyed.

6. *After culture.*—If the young trees become loosened from the wind or otherwise, tread them in again as soon as possible, and if a moderate quantity of old manure and ashes or lime be spaded in about the roots every spring, so much the better. The best crops for orchards are potatoes, beets, turnips, cabbages, peas, beans and any short crop except oats. Any crop put in the orchard, should bear ploughing two or three times in the year.

By this course the trees will grow more vigorously, bear from one to three years earlier, yield larger and better flavored fruit, and, in the judgment of the writer, last much longer.
Nashville Agriculturist. T. F.

FENCE LAW OF VIRGINIA.

Fairfax county, Feb. 8th. 1843.

To the Editor of the Farmers' Register.—Your last letter found me much indisposed, and was therefore laid upon my table. The fence law is an old sancer, and must not be handled freely. Proud as we are of our institutions, many of them are adapted only to a frontier society, in other words, *half civilized.* To correct the evils of the fence law we must begin with the people, the dear deep minded people; and who dares to tell them that they are ignorant? Who will say that they are ignorant of the first principles of civilized society? Yet, sir, it is so. For, if you can *use* a man's land, you can use his ox, his horse or his wife, and nothing but bold demonstration constitutes right. This is an awful fact, and I tremble to look to its consequences. Where will they stop, or even pause? *Self-gratification* is the great moving power of human nature; it is for this that he toils, cheats, swindles, steals, or sheds blood, or even bows himself in prayer. Did not Satan come up with the children of God in this feeling to worship? Charity is lovely in all its actions, but truth is of God, and must prevail. Again, what but this feeling caused Judas to betray his God, his benefactor and party? I rest my appeal with the whole Christian family, however modified. Varied as they are by strength of mind, of heart, or length of face or *nose*, the result is the same—it is self-gratification. What hope then can we have for mending the fence law, since it is the interest of the majority to make the whole state a modified common? None, sir, none. I therefore suspend operations, in the hope that *all* will see that it is for the general good that every man should be confined to his own: bad appetites may be encouraged to the ruin of all. Lime and Right.

THE FARMER'S RESIDENCE.

December 18, 1842.

I have often expressed surprise at the want of taste exhibited by the great mass of farmers in this section of the state, in respect to their houses and the scenery surrounding them. I do not mean that their dwellings are not usually sufficiently expensive. They are often too much so, and are decidedly out of taste in this particular. But I refer to that careless, slovenly aspect, which many, not to say most farm residences (costly ones too) exhibit in their architectural appearance, in their location, their fences, the position of their out buildings, the laying out of the grounds surrounding them, and in the general absence of trees and shrubbery.

I am aware that some readers will be disposed to regard this as an unprofitable and unimportant subject. Such persons will say that if a house answers the purpose of sheltering the farmer and his family from the elements, and keeping him comfortable, it performs its office, and that its looks are of no consequence; that all this is mere pride, and deserving of no consideration. Such persons are mistaken. Man's nature is such, that when his faculties have received enough cultivation to raise him above the level of the brute, he takes delight in objects which approximate towards perfection—he prefers order to confusion—he receives more gratification in looking upon beauty than upon deformity—neatness presents to his eye a more pleasing picture than slovenliness. This principle or feeling of human nature is the source of much innocent enjoyment, and deserves to be cultivated rather than repressed. And what more fit place for it to seek gratification, than *at home?* Why should not the farmer, his wife and children, rest the eye upon order, neatness and beauty, at and around their own dwelling? Would not the influence of such scenes, if allowed to exercise their natural tendency, be to spread cheerfulness and contentment over the domestic circle?

The beauties of nature, which can be so easily possessed and enjoyed around a farm house, are very generally sacrificed by the stinted plot of ground set apart for the occupation of the buildings, and for the yard. The house is placed about two rods from the street—a fence is then run from the two front corners to the street, and thus is formed the "front yard," as it is called,—being a sort of coop, so small that you could not stand in the centre and swing a cat round you, without knocking its brains out against the fence posts. Perhaps adjacent to this, and directly under the windows of the house, is located the hog, or cow yard—or perhaps the hog pen, or corn house, or wash room, or some old shed is honored with a location almost in front of the house, and so as entirely to obstruct the prospect. Some may say, that a farmer should not turn up his nose at the exhalations of the cow yard or hog pen. With all deference to the opinions of such, I prefer to select the occasions when I will enjoy them, and not be obliged, when sitting at my windows, to inhale their perfumes *nolens volens.* Not a single shade tree probably breaks the rays of the summer's sun, and scarcely a blade of grass is seen except within the limits of the aforesaid *coop* in front of the house. The grass plats are by the swine rooted up into sand patches, where multitudes of *fleas* "trip the light fantastic toe."

In cities and villages the price of land forbids the enjoyment of rural scenery, but in the country no necessity exists for being deprived of this luxury.

Now I suspect that the man who talks the loudest of the vanity of bestowing attention upon such trifles, would feel vastly more comfortable, snugly ensconced in a farm house, *such as it ought to be*, than in one *such as it usually is.* And what ought it to be? Let us see.

In the first place, we will measure off at least one acre of land as near as may be in a square, and enclose it in front and at the ends with a plain but neat light fence, painted white, and in the rear with a high close board fence, well white-washed. Next, as near as may be in the centre of this acre, we will place a small plain white cottage, built not expensively, but with perfect neatness and taste. The house being erected, we will next contrive to have our acre well seeded down, and the whole covered with a thick rich sward of grass, and then we will fill the enclosure with trees, so thick as to make it almost resemble a grove, but not so near the house as to render it too damp from the shade. We must be particularly careful not to permit any *barbarian* to subdivide our acre by means of cross fences, and thus cut it up into pens, that look as if they were made to yard sheep in. This would utterly destroy the beauty of our residence. Let us have an open space all around the house. On the line of the rear fence we will have our carriage house and other out buildings. At one end of the park we will locate our garden, and along the other end there will be filled with such shrubbery as my wife and daughters wish to cultivate. It will never do on any occasion to turn animals loose into this yard, as they will destroy the trees and shrubbery.

As soon as the trees acquire a moderate growth, what a beautiful summer residence would not this constitute! How in contrast with the ordinary farm houses of the country! And yet such a residence need not be more expensive than those which are barren and desolate. Who would not prefer a house which would cost only $500, thus located, to one costing $2000, situated as the one first above described! How beautiful would be a farming country filled with such cottages! Will not some of our farmers, who have occasion to build new houses, adopt the above plan? And will not some who have old ones, remove their fences, and sheds, and hog pens, and surround their homes with nature's living green? If this should be done during their absence from home, they would not know their residence on their return, or at least would suppose that some fairy had been busy with Alladdin's lamp.

If any of your readers have any objections to the above observations, I should be glad to hear from them through the columns of the Farmer. Z.

Central New York Farmer.

CHOLIC IN HORSES.

I was told lately by a gentleman of Prince George county, that a tea-cup full of spirits of turpentine would give instant relief to horses laboring under this disorder. He added, that on one occasion, all the *oxen* of two of his carts were *hoven*—that is, as you know, suddenly swollen by the generation of gas in the stomach, from eating green food. The overseer expected all would die, when our informant ordered a tea-cup full of spirits of turpentine, diffused in oil, to be given to each. The relief was in every case *instantaneous* and effectual, almost before he could have thought there was time to swallow. Such facts should always be communicated for wide diffusion and preservation, in agricultural journals.—*American Farmer.*

RUST IN WHEAT.

Sandy Point, 15th February, 1843.

To the Editor of the Farmers' Register. —I have perused with much interest your remarks in the January number of the Register, on rust in wheat, &c. Should the application of lime to the soil prove a preventive to this truly ruinous disease, the benefits resulting would indeed be incalculable; but whatever may be its effects in this way in some soils and locations, it certainly does not so act on all. From my own experience and observation for the past few years, land that has been limed has been any thing but exempt from this disease; and, in some instances, wheat on limed land even appeared to suffer more than on land which had not received a dressing of lime. A portion of the wheat crop on this estate, of 1842, was sown on land which had the preceding year received a dressing of oyster shell lime to the extent of 120 bushels per acre, on which the wheat was altogether ruined by rust; and on another portion of land adjoining, which had at the same time a heavy application of marl, the result proved equally ruinous. These results, however, I should be inclined to consider as exceptions to a general rule; for lime certainly cannot be promotive of this disease. If it does not prevent this great evil, and, from considerable observation I do not think that it does, I should infer that it has a tendency at least to mitigate it, especially in soil rich in putrescent matter. To the successful culture of wheat, lime is doubtless an indispensable ingredient in the soil.

The object which I have in view in this communication is to give a few observations which the last season presented to me, in the progress of rust, which prevailed to a serious extent over nearly all of the large crop of wheat on this estate. The first appearance of rust was on a small portion of rockwheat, sown partly around some occupied houses, and in an old yard under the shade of a few trees, and in which was much the strongest growth of wheat. Rust, however, first attacked that immediately around the occupied houses, where, in consequence of the injury received from chickens and trampling by children, &c., the growth of wheat was the most indifferent, and it speedily spread over the whole, but was worst around these houses and in the old yard. The next appearance of rust was in the white turkey variety; and here I endeavored to watch its progress narrowly. The field sown with this wheat, after corn, was intersected by a road to which a furrow from either side had been thrown after sowing of the

wheat, straggling grains of which were thus placed on the sides of the road, where they were permitted to grow, receiving, however, continued injury from trampling. The growth was stinted and dwarfish compared with that in the general field on either side of the road. Soon after the flowering season, and preceding the rust, the leaves and stems of these straggling plants were covered with a white substance resembling mould, and presenting to the touch a gummy feeling. Rust succeeded, and rapidly spread over all this variety of wheat sown after corn, but was not, with the exception of the straggling plants on the road sides, preceded by this white appearance, and it did appear to me that the progress of the disease advanced regularly and rapidly through the field from either side of the road. A few days later, rust appeared in a neighboring field of mountain purple straw wheat, intersected by the same road, and having from the same cause straggling plants on either side, and on these the indications of rust were first observed, but not preceded by the white appearance first observed on the straggling plants of the white turkey variety; and in this field the disease evidently advanced from south to north. All on the north side of the road was seriously injured, least so at the northern extremity. All on the south side of the road suffered comparatively little injury, and proved to be the best and heaviest grain throughout the crop. Within a day or two subsequently rust was observed in patches in both the white turkey and purple straw varieties; first where there was a considerable mixture of carrot weed, next (as observed) on spots where wheat had been lodged by a heavy rain, then along the margin of ditch banks, and hence throughout the field. I have observed for some years past that the white turkey variety has always suffered more from this disease than the mountain purple straw.

In presenting the foregoing statement, I merely relate the observations as they occurred to me, with the view of adding my mite to those of others who are much better qualified to investigate the nature of a disease which so frequently blasts the fairest prospects of the farmer; and, notwithstanding all that has hitherto been written on the subject, it appears to me to be yet shrouded in mystery. Mr. Peyton's opinion, that rust "results from a plethora induced by excessive vegetation," appears to me to be the most probable predisposing cause; and, from my observations, as above stated, I would, so far as they go, be inclined to the inference that external injury, by the straw being broken, bruised or prostrated by heavy rains, thereby facilitating the exudation of the juices, greatly accelerates the developement of the disease. In the various fields composing the wheat crop on this estate last season, with one exception, the disease first presented itself amongst the most indifferent growth of wheat, and that most exposed to injury. The exception was in a twenty-acre lot, after corn, much infested with carrot weed, and where the growth of wheat was also heavy. I do not consider the carrot weed as inducing to the disease in any other way than by preventing a free circulation of air, and holding for a longer period an injurious degree of moisture.

Rust is a disease known amongst British farmers under the general terms of "blight, red blight and red rust." The general opinion in that country as to the predisposing cause, coincides with that expressed by Mr. Peyton; the disease, however, prevails there to a much less extent than in this country, and is most prevalent in seasons when close, warm, foggy weather, or frequent showers and hot sunshine occur between the flowering and ripening season, and is, I believe, of less frequent occurrenee in the northern counties than in those farther south, and consequently warmer. The opinion is also prevalent in that country that the exuded sap induces a growth of minute fungi, which imparts the rusty color, propagated with amazing rapidity, and whose extremely minute seeds, carried by the winds, or infected plants coming in contact with others, rapidly spread the disease. Some farmers in that country also entertain the belief that the application of putrescent manures immediately before sowing wheat, by exciting an over luxurious growth, induces this disease. In such cases the mode is adopted of subjecting such manured land, between the manuring and sowing of the wheat, to an intervening crop, such as beans, &c. In this country I have almost invariably observed rust most prevalent on wheat following corn.

In England there is another disease which frequently occurs amongst wheat, very much resembling rust, known by the name of "red gum," affecting only the ear, and considered more destructive than that species which they designate by the name of "red rust." In that country I believe no preventive has yet been discovered for any of these diseases in seasons unfortunately favorable for their propagation. The drilling of wheat, by admitting of a free circulation of air, is there by many considered a palliative. I have also heard the opinion there expressed, that in districts of country where bones were extensively used as a manure, the disease had become less prevalent. Might not this benefit be the result of giving directly to the soil an additional supply of the phosphate of lime?

A. NICOL.

WHITE CARROTS.

This is a new species of that valuable root, and, from its uncommon productiveness, must be an important acquisition in field root culture. For milch cows, and any other stock, it is cheap and rich food. From our own experience we are enabled to say, its growth excels the common orange carrot in its yield. Unlike others, it projects several inches out of the ground, like the sugar beet, or long turnip. In rich soil with deep tilth, the production is enormous. Twenty-two tons are said, in the American Agriculturist, to have been raised per acre this year in Massachusetts.—*Farmers' Cab.*

REPORT TO BOARD OF AGRICULTURE.

BY EDMUND RUFFIN.

Continued from vol. x., page 514, Farmers' Register.

III. Of mill-ponds, as producers of malaria and disease, both alone and in combination with other causes.

That the common autumnal or bilious diseases of eastern Virginia, and especially of the tide-water portion, which is most subjected to them, are principally caused by the effluvia rising from wet lands, is a matter in which all concur. The general difference between the presence of these disorders, in low, wet, or marshy countries, and their absence, or scarcity, in mountainous and dry regions, is so great, that none can mistake, or differ about, the *general* causes and effects. But from this general opinion, which is true in the main, (though having numerous and important exceptions,) there is deduced the erroneous conclusion, that these opposite general effects produced on health, in extensive regions either generally low and wet, or generally hilly and dry, are produced by these opposite natural features, and cannot be very materially altered by art; as art cannot materially alter the natural character of the land. Or, in other words, that nature has made one great region low and sickly, and another high and healthy; and that man cannot do much to counteract the law of nature in either case. Perhaps none may maintain this position, in argument, without admitting partial exceptions in numerous particular cases and localities. Indeed, every man will say that care may lessen the causes and mitigate the operation of malaria, in a sickly region, or increase both in a healthy one. But, judging from the action of both the people and their laws, which speak more strongly than words, it may be inferred that it is a general belief that such bendings of nature from her course can be but slight, in particular cases, and scarcely worth estimating on a broad scale, or through an extensive country. In entire conformity with this supposition, it is a notorious fact that very few individuals in Virginia have done any thing considerable, or on system, to protect their dwelling places from malaria; and the government has not only done nothing for general protection, but has actually caused the worst of the existing evils, and is encouraging their continued increase and aggravation, by the fixed legal policy of the country. The production and deadly effects of malaria, in eastern Virginia, for the greater part, is to be charged, not to the laws of God, but to the laws of man; which, in this respect, operate to put away or sacrifice some of the most precious of God's blessings, offered to all, to gratify the whims, or the blind and often mistaken avarice of a few individuals. There are, doubtless, great *natural* differences as to the sickliness of differently situated regions; as between the low tide-water region of Virginia, the central or hilly, and also the mountainous region. But, in their natural state, before damaged by mill-ponds and other of man's miscalled improvements, the low-country was probably less afflicted by malaria, than the hilly parts now are, or may be rendered by the full extension of these injurious operations of man. This is a matter of mere supposition, and cannot possibly be subjected to the rigid test of proof by known facts. But, from reasoning, and inferences from such facts as are known, it seems most probable that some of the now most sickly counties on tide-water were, at the first settlement of the country, less sickly than the hilly and originally very healthy county of Brunswick, for example, has become in latter years.

Even the very important fact of increased and increasing sickliness in this country, is entirely without support from any known written authority; and the whole subject has been so little examined, or thought of, that to most readers the position here assumed may be entirely new. There are no statistics of health to which we can refer for proof. But general and historical facts, few as they are, if fairly considered, will suffice to place the question beyond dispute.

One of the strongest proofs of the greater former healthiness of the low country, was the settlement of our English ancestors having been made and continued at Jamestown. It was on May 13th, when they landed; and now, a residence on that spot, or in that region, continued for five months after that time of the year, would be fatal to half of the strangers from a northern climate, even though provided with all the comforts and necessaries which a long settled country affords, and all of which the first settlers most deplorably needed. It is true, that for some years after the first settlement, there was much sickness, and numerous deaths; and that in fact the infant colony was more than once on the point of extinction. But these diseases and deaths do not seem, from the direct and the still stronger indirect testimony of history, to have been attributed by the sufferers to an unhealthy location; and there were sufficient other causes for all that was suffered, in the usual and unavoidable privations of the first colonists of a new and savage country, added to the extreme improvidence and mismanagement of these settlers, and their government, as detailed in history. Even after several years had passed, and though cultivating a very fertile soil, and aided by annual supplies of food from England, and with all the resources of trade with the savages, hunting and fishing, still want of food was one of the greatest causes of disease and death. Of course, there must have been, under any circumstances, more or less of disease caused by malaria; and although any predisposition to such disease, naturally induced, must have been violently urged to action, and aggravated to ten-fold malignity, by hunger, intemperance, exposure of every kind, depression of spirits, and every other painful emotion of the minds of men in such desperate straits—still, even with all these aids, the prevalence of autumnal diseases, the effect of malaria, was not so conspicuous as to

stamp the character of sickliness on the location, nor to induce even the proposition to remove the colony, or afterwards its seat of government, to a much higher or more healthy situation. The unavoidable inference seems to be, that the great sickliness of the early settlers was not attributed by themselves to the climate. Yet this was a question on which they could not possibly have been deceived. And even if most others had been deceived, by ignorance, and the want of experience of the effects of malaria, this could not have been the case with Smith, the most efficient director, and the true founder of the colony; who would have known better, not only by his general intelligence, but also by his experience of such effects, gained in his campaigns against the Turks. It may be alleged, that fear of the savages, stronger than the dread of disease, caused the choice of, and after-continuance on, an unhealthy spot, because it was more easily guarded on the land-side, and perfectly accessible to ships. But spots equally favorable for defence, and on deep water, might have been selected at first, much higher up the river; and yet Jamestown and its immediate neighborhood continued to be the chief place in Virginia, after the power of the savages had been crushed, and settlements had been extended to distant and inland places. The proof of my position would be sufficiently proved by any attempt made now to settle Englishmen, just arrived, on the border of almost any of our tide-waters, and especially about the junction of the salt and fresh waters. Several such trials have been made with foreign laborers; but the first autumn was enough to put an end to each experiment, by inflicting so much disease and death as to prevent any of the foreigners remaining through another season, who could possibly move away.

There can be but little doubt also, that there was much less of autumnal diseases, or at least of violent and fatal diseases, before the revolutionary war than now. There was no such thing then, as the healthy residents leaving home in summer, as is so usual now, to spend the sickly season among the mountains, or at the north; nor does it appear that there was much suffering for want of such resources, although the climate must even then have become very far more unhealthy than in the early times of the colony.

Another striking proof of the increased tendency of the country to produce disease, even within the last 60 years, is presented by history, in the circumstances of the occupation of Yorktown by the British army in 1781, and the siege carried on by the American army; and especially in regard to the hastily levied militia from the mountains, and other high and healthy parts of Virginia. Cornwallis chose his position first in Portsmouth, and afterwards in Yorktown, with a view to health, as well as defence, to await the arrival of reinforcements from New York. His army was concentrated at Yorktown, August 22. Washington reached Williamsburg, September 14, and the American army moved on thence to invest Yorktown, September 30, and the surrender of the British army was made on October 19th. Thus, both armies were exposed to the worst part of the malaria season, and the British army to the whole of it. Among the besiegers, were raw militia just raised for the occasion, from Rockbridge county, (of which portion I have been more particularly informed,) and probably from sundry others of the mountain counties. There was certainly much sickness, and especially among the British troops; but not more than is usual in camps, and especially in besieged camps, suffering all the privations incidental to the confined situation. It does not appear, from the very slight notices in history, that there was more sickness than might have been expected if the same circumstances had occurred in the hilly middle region of Virginia. Yet, if the like circumstances could occur now, it can scarcely be doubted but that every soldier, not already acclimated and accustomed to malaria, would be made sick; and that probably half of those just brought from breathing the pure mountain air, would never return home.

Another indirect proof is presented in the great and deplorable decline of most of the lower counties of Virginia in wealth, and in the usual accompaniments of wealth, which formerly made a residence delightful in many neighborhoods in which there is nothing now left to invite any one to remain. It is true that other causes, political and economical, have concurred to produce this result. But the most potent of the several causes was the slow and silent, but continual and increasing warfare on the health of body and mind, made by the action of malaria. By its operation, when scarcely amounting in effect to positive and known disease, the mind is sickened even more than the body. The buoyant spirits are tamed—energy is relaxed—the keen appetite for enjoyment (which is the greater part of happiness) is lost; and the victims of malaria cease to strive, or to enjoy, and either sink into apathy and listlessness, or urged by discontent more than by any remains of energy, take the final step of emigration to the western wilderness.

But the upper country furnishes still stronger evidence, because of positive and unquestionable facts, to prove an increase of the product and effect of malaria. The hilly country between the falls of the rivers and the nearest mountain range, with the exception of some comparatively small spots, on swamps and rivers, was formerly as free from this scourge as is now the mountain region. But the number and the extent of the unhealthy places have greatly increased, within the memory of those now living; and some large districts have been, in particular seasons, as subject to bilious diseases, and still more to violent ones, than the tide-water region. Indeed, in very many places, universally believed (unless by the mill owners) to be injuriously affected by the neighborhood of mill-ponds, these effects of malaria are of as regular recurrence in autumn, as on places near to any of the marshes of the low country; and are much more dangerous.

The third and highest region seems destined, notwithstanding its better defence in mountain sides and peaks, and the rarity of flat surface on which to form wide and shallow ponds, to take its turn next as the victim of malaria. Already, in that part of the mountain region in and about Frederick county, there have been particular autumns which seemed almost pestilential. And though such cases of general and virulent disease are rare, particular cases of autumnal diseases are now frequent in many such places where they were rarely heard of 30 years ago.

These statements may be considered by some as exaggerated or unfounded, and by others, if admitted to be true, considered as showing the want of both patriotism and policy, in the writer's thus exposing the enormous existing and still growing evils under which the country suffers. In regard to the former point, I admit, in advance, the scarcity of particular and positive facts to serve as proofs, which is found throughout the whole subject; and that among the existing difficulties of obtaining such facts, (and still more by a single and unaided individual, who has had little opportunity to make proper researches,) I have to rely mostly upon general and loose opinions and deductions from general facts. Hence there is much liability of mistake. But if the public can in any way be driven to the examination of this subject, and numerous individuals be excited to search for facts, whether to sustain or to oppose my views, the arrangement and presentation of such facts will serve as materials, which are now almost totally wanting, and will enable this all-important question to be hereafter properly discussed and correctly determined.

If there were no hope for relief, there would certainly be no use in exposing or dwelling upon these distresses of our people. But, though nothing yet has been done for relief, nor does it seem to have entered the imagination of our legislators—and though all they have yet done has been to add strength to the evil—still it is my confident opinion, that relief may be furnished for this sorest evil of the land, and furnished easily and profitably; and that it is perfectly within the power of man to dry up the most fruitful sources of malaria, and to bring the whole, or very nearly the whole of Virginia, to a state as healthy as that of any other country in the world. If such a result is indeed attainable, it is worth making every possible exertion for; and nothing will induce the smallest exertion, either by the people or the government, except a full exposure of the enormity of the evil which presses upon the country.

It is not my purpose to attempt to investigate the cause and trace the mode of operation of malaria. Though worthy of every care and labor, as a scientific question, it is one which as yet has entirely baffled every attempt at exposition. But though it is as yet unknown what is the chemical character of this subtle fluid, and what are the precise circumstances under which it is evolved, and what is the manner in which it exerts its baneful influence—still the main and most important points admit of no question. Thus, and in general, all persons, from the most ignorant to the most learned, agree that there is *something* which rises into the atmosphere, in hot weather, from marshy ground and stagnant waters, which tends to produce the common autumnal fevers in those who are much exposed to breathing the air contaminated by this admixture.

But however little may be known as to the causes and sources of malaria, and however widely opinions may differ as to particular effects, all inquirers agree that decaying and putrefying vegetable matter is one of the greatest, if not the only source of malaria. Of course, then, in addition to the sufficient abundance of the material, the circumstances most conducive to its putrefaction must be the most favorable to the production of malaria.

The presence of moisture, a certain degree of heat, and the access of air, are circumstances *essential* to fermentation, and of course to the production of malaria; and neither can take place without the aid of all three of these things. Much moisture would be less favorable than a less quantity; and entire covering by water would, by excluding air, in a great measure prevent fermentation, and its consequence, the formation and escape of malaria.

It is also one of the few settled points, among scientific investigators, that malaria is very light, at least when warmed by the sun; and hence the fact known to many in this country, that those who live on the borders of marshes, and of mill-ponds, sometimes escape all injury from their exhalations, when others, who live on high hills, and at much greater distances from the sources, suffer greatly by the disease produced. Facts of this kind are numerous, and of regular annual occurrence, in Gloucester county. The whole of the wide and very level low-grounds furnish residences very healthy, compared to the tide-water region in general; though intersected in every direction by tide-waters, and though there still remains much swamp land unreclaimed, such as the whole body of low-ground was when in a state of nature. But the high, dry and hilly land, which forms the ridge of the county, is less healthy; and the highly elevated and beautiful sites of mansion-houses over-looking the low-grounds, are universally sickly in autumn.

The putrefaction of vegetable matter, mixed with other things, as earth and water, and under peculiar circumstances, (though neither the precise admixture nor the circumstances are known,) produces disease to such extent, that there is no doubting or mistaking the connexion of causes and effects. Such sure and abundant sources of malaria are the following materials. 1st. The putrid and stinking water of stagnant ponds, partially dried by the heat of summer. 2d. The mud bottoms of such ponds, or of streams reduced by drought, rich in decomposed vegetable matter, and left bare of water only in summer. 3d. Fresh-water marshes, of vegetable soil, frequently, but not regularly, covered by the tides. 4th. The meeting of salt and fresh waters on land full of vegetable matter. Of

these several and most important sources of malaria, I deem the third (fresh-water marshes in their natural state) to be the least hurtful; and that the sources numbered 1st, 2d and 4th, increase in virulence in the order in which they are named. The greater evils produced by the last are universally admitted, but still by an erroneous deduction from the premises. The belt of the tide-water region of Virginia, in which the fresh water flowing down the rivers mingles with the refluent salt water from the ocean, is well known to be more subject to autumnal diseases, than any other extensive space in the country. The breadth of this belt varies much in different seasons. The parts of the rivers in which the fresh and salt waters meet, and where each alternately has possession, as the tide ebbs or flows, may be but a few miles wide, and even that space is not stationary. But if the limits of this belt be fixed by the highest points to which the rivers have been known to be brackish, in driest summers, and by the lowest points where they are fresh in winter, then this belt may be considered for the time as 40 or 50 miles wide, and, in length, stretching across all the tide-waters of the state. But in the much narrower space where this mingling of the salt and fresh waters usually takes place during the heat of summer, malaria acts with most intensity. Hence the general opinion, that it is simply the meeting and mingling of the fresh and salt waters which cause disease. This is not so, or but in a very slight degree. It is either the passage of fresh-water over salt-water marshes, or of salt-water over fresh-water marshes, that causes the great production of malaria, and disease. This is an important distinction, and the truth or error of the position deserves the most careful investigation. If the mere mingling of the waters were the cause of sickliness, any relief for this part of the evil would be hopeless, as the waters *must* meet and mix together, *somewhere*. But if it be as I suppose, the evil may be greatly restrained by works of art, or by simply preventing the unnatural accumulation of vast reservoirs of fresh water in mill-ponds, which when discharged, by breaches in the dams, or by opening the flood-gates, overflow salt marshes, which the natural or unobstructed stream never could have covered.

Salt water marshes, not touched by fresh water streams, are not unhealthy to any considerable extent. This is susceptible of proof by innumerable examples in Virginia on the borders of the ocean, or of the waters of the Chesapeake bay. It is rare, however, to find a large salt-marsh attached to extensive highland, which is not reached by some small stream; and every salt-marsh of course must sometimes be well washed and freshened by the heaviest falls of rain. Therefore all must, slightly and at some times, be prejudicial to health. These, however, are exceptions of but small practical or sensible operation.

The view here taken of the manner in which malaria is produced most certainly, and acts most injuriously, though not sustained by any known authority in this country, nor by any other precisely as stated here, is not therefore presented as original. I derived it, and thence deduced my application to this country in a modified form, from the interesting report on the malaria of Italy by Gaetano Georgini, of which the substance was published in two different papers in the Farmers' Register, (p. 502 of vol. iv. and 460 of vol. v.) In this report the author shows by the most conclusive argument and facts, that the irregular irruptions of sea-water over tracts of marshes, or other low grounds of fresh water alluvial formation, caused the long continued and worst effects of malaria; and that by simply guarding against the entrance of sea-water, the country was restored permanently to healthiness. He says nothing of the reverse operation, the irregular floodings, with fresh water of salt marshes. But what is produced by the one can scarcely fail to be as well produced in the other case. The *mode* in which the effect is produced is not attempted to be explained by the learned author quoted above, nor does any explanation seem sufficient to my mind. The rapid and abundant production of malaria may perhaps be aided, if not entirely caused, by the luxuriant cover of fresh water plants, in the one case being partly killed and made ready for putrefaction, by being covered by salt water; and in the other case, in this country, by a like injurious operation on the plants peculiar to salt marshes produced by the overflowing of fresh water. We know that certain plants flourish best in salt and wet soil, as others do in wet soil entirely free from salt; and that respectively with these different growths, the salt and the fresh marshes are heavily covered. It must follow from a sudden change in the condition, from salt to fresh, or the reverse, that the health of the entire growth must be greatly injured, and much of it subjected to death and decay.

Tide-marshes, however extensive and injurious in their operation on health, still are limited to a comparatively small proportion of our broad territory. But there is another source which spreads disease over half the state, and which is entirely of artificial formation, and of which the evil effects have been becoming more and more extensive, and more and more virulent, from the early settlements of the country to this time. This wide-spread and generally operating source of disease and death is furnished by the numerous mill-ponds, of variable height of surface, which are now scattered over the whole face of eastern Virginia, and of which every individual case adds something to the general and enormous amount of injury to health and to life.

There has long prevailed in Virginia a mania for building water-mills, which was not restrained by insufficient regular supplies of water to fill the ponds, nor by the insufficient prospect of business and of profit, even if there were no failure of water. In consequence there have been not only erected mills on every stream barely sufficient to keep a common corn-mill in operation, but also on as many others where the water power was either insufficient, or totally failed during the

driest season of every year. In the tide-water region, the mills for grinding wheat-flour, or any thing else for sale abroad, are limited to the falls of the large rivers. All the others, (and probably there is on an average one for every square of six miles,) are merely designed to grind for toll the corn used for bread in the immediate neighborhood, and considered merely in regard to money-cost and profit, it is most likely that half the mills in the country do not get enough toll-corn to pay for more than the costs of maintenance and repairs of their establishment. The more worthless the mill, on account of the insufficient supply of water, the more productive it necessarily is of malaria, disease and death. It will be difficult for me to make those who are unacquainted with our country believe that hundreds of mills have been built, and that most of them are still kept up, and many more new ones will probably yet be added to the number, which cannot yield any clear profit, above the entire cost to the owners, independent of cost in property to the neighbors, and the cost (whatever that may be) of health and life to the country at large. Still the fact is notorious throughout lower Virginia, if it does not extend through the higher middle country. The only reason that I can conceive for so many unprofitable investments of this kind is, that many residents of the country build mills, as many others raise race-horses, more for amusement and excitement, and to vary the monotony of their lives, than for profit. But this propensity of individuals could not have done much mischief to the country at large, but for the encouragement offered by the government. According to the law, and the long established usage under the law, any man who desires to erect a mill, and for which it is necessary to pond the water on some of his neighbors' land, has nothing to do but to apply for an order of the county court, by which the sheriff summons a jury to meet on the spot, to judge of and assess the damages that will be sustained by the owners of the lands designed to be covered by the pond. The jury is generally composed principally of men as ignorant and unfit for such investigations and estimates as the neighborhood can furnish—and they decide by guess as to how much land will be covered, and what damage will be sustained in the loss of the use of the land. There is no question presented to them or entertained as to whether a mill is at all required by the demand of the neighbors for meal; and if the question of the effect on health is even named, it is addressed to a body entirely unacquainted with, and regardless of the whole subject. In fact the question as to health has rarely been considered in any such cases, and never duly considered. If the land that will be covered by a pond, though very rich, is then in the state of swamp, and totally unproductive, such an uninformed jury, as the case is usually submitted to, will be very ready to decide that such land is worth nothing; and if $3 an acre is given as damages, for the land actually to be covered by pond, it will be deemed a liberal allowance. The court will rarely refuse to sustain the verdict of the jury.

Though the use of the land thus covered is for ever taken from the owner, or, for as long as the mill owner may choose to keep up his pond, still the right of property is not changed. This small reservation of right, or feeble homage to justice, serves as a still further injury to the community, and is not of the least value to those to whom the right is reserved. It would be far better for all parties, if, when land was thus condemned to be covered by a mill pond, that the damages assessed, however low and pitiful compared to the damages actually sustained, should have been deemed the purchase money of the land, and the absolute right of property vested in the mill owner. If this were the case now, there are many mill ponds in Virginia which would be forthwith laid dry, even though the mills should necessarily go down; because the land covered by the ponds is now known to be worth more for cultivation than the mill is for toll. Hundreds of other mills, of greater profit and value, also, in that case, would be better supplied with water by canals than by their present ponds, by which their value as mills would be increased to the owners and to the public, and the nuisances of the ponds be equally abated. But as the law now stands, if a mill, which will not bring in of net rent $50 a year, covers by its pond 500 acres of rich land belonging to other persons, the mill owner has no interest whatever in draining the pond, because its drained bottom would belong to other persons. In any case approaching to this, and in which there would be a gain to all the individuals concerned, by draining the pond, still it is not done, and the nuisance continues long after it is well known to be such, because there is a contest between the several owners of the pond and of the land covered by it, in regard to their respective shares of profit to be gained by emptying the pond. Many such cases still exist in Virginia; although many of the most unprofitable ponds, from proper views of economy, have been drained, and either substituted by cheaper and more efficient canals, or the mills put down entirely. An old mill pond in Dinwiddie county, which covered 1200 acres of land, has been drawn off, and thereby an unprofitable mill exchanged for a large fertile farm. This would not have been done, even if the mill was worthless, but for the ownership of the mill, and the land covered by the pond, falling into the same hands. There is a mill pond now kept up in Prince George county, which is supposed to cover nearly 400 acres of land; and there are many others not much smaller, on different branches of swamps in lower Virginia. The larger the pond, in general, the greater proportion of bottom is left dry in autumn, and the more disease is therefore produced; and though the draining of such large ponds would be so much the more an object of gain, there is the less chance for its being done, because of the separate ownerships and interests.

Almost all the mills throughout the lower part of Virginia, and also a large proportion

of those in the more hilly middle country, are worked by streams which are inadequate to the daily supply of the mill, and evaporation from the pond, even if the grinding is not necessarily suspended or diminished at any time. To guard against the temporary failure in dry weather, the full "head" of the pond, (or the level of water for which damages were assessed, and to which the water may lawfully be raised,) is much higher than the lowest level that will work the mill. The land covered is also usually very nearly level, so that to raise the water 10 or 15 feet at the dam, will often throw back the water from one to two miles up the low-grounds. If the variation between a full head of water, and the lowest level, be 5 feet perpendicular, it will often cause the uncovering of many acres of the bottom of the pond to the hot sun, and thereby furnish a most fruitful source of malaria in every such case. Rich alluvial mud, as this always is, thus exposed in hot weather, cannot be otherwise than very injurious to health; and there is not a pond mill in Virginia, with a variable head, which has not more or less of the pond every summer thus converted to a fruitful seed-bed and nursery of disease.

Besides this, there is the not rare occurrence of the pond being entirely drawn off in summer, by the breaking of the dam, and suffered so to remain for weeks or months, before being again repaired and filled. In this case a double quantity of bottom is exposed to putrefaction, and fitted for the discharge of unhealthy miasma.

At all times, in ponds supplied by streams as feeble as most of those used for mills in Virginia, the water approaches to a stagnant state; and therefore, of itself is a producer of malaria. In dry seasons, when unusually low, the putridity of the water of such ponds is perceptible to the sense of smell; and it must be then far from harmless.

Another, and, in certain situations, the greatest evil of mill ponds, remains to be stated. The others above mentioned are the effects of the scarcity of the supply of water; this is from the excess, which is found in all streams, at some times, even though the most deficient at others.

To guard as much as possible against the expected scarcity of water, the mill owner aims to hold, when rains increase the usual supply, as "full a head" as he has a right to maintain. When this supply is exceeded, as it frequently is, and greatly, if the dam is not actually broken, and the whole emptied in one prodigious flood, at least the floodgates are opened widely, and a discharge made ten-fold greater than would have occurred during equal time, if the stream had not been obstructed by a dam, and had discharged as regularly as the supply was increased. It will be evident, on considering these circumstances, that water from a mill pond, whether discharged by floodgates or otherwise, must be far more variable in height, and in extent of inundation on the land below, than the natural stream, unobstructed by art; and still more than the stream opened and improved, and its course facilitated by art. An ordinary natural stream, which might have a very uniform discharge in dry weather, and would rarely overflow its banks in wet, if dammed across for a mill, would often have its bed below the dam, left almost dry; and at rare and irregular times, would be converted to a tremendous flood, which would sweep over many hundreds of acres more than the floods of the natural stream could have reached. Besides the immense damage caused to cultivated land by these floods, (and which kind of damage is rarely estimated or thought of by juries, when mills are established above,) there are numerous hollows made, and filled with water, which, on the retreat of the flood, (as hasty as its inroad,) remain so many stagnant pools, until made dry by evaporation. The whole land, thus covered, is saturated with water; and, from the nature of the rich alluvial soil, is throughout, as it dries, made a producer of malaria.

But the worst part of this evil, by far, is when these artificial floods of fresh water pass over salt marshes—which happens in all the country in which the fresh and salt waters meet; and this combination of causes I consider the most efficient producer of disease in that part of the country, and the thing which ought most especially to be guarded against. According to the views before presented, the passage of fresh water over salt marshes, no matter to what extent, is one of the most sure producers of malaria, and of a particularly malignant kind. The mill ponds alone, form other and far more extensive, if weaker sources of the poison; and by the union of the two, the mill ponds exert all their usual bad influence above the dams, and spread ten-fold more pestilential effects below, by inundating the wide salt marshes, which by natural streams would scarcely have been affected.

On Nansemond river there are lands already rich, and having inexhaustible supplies of the best marl, which have been sold at $10 the acre. There are hundreds of estates in the same belt of country, which cannot be sold for as much as the cost and present value of the buildings. And this otherwise fine country, so accursed by disease, owes its conditions principally to the streams which flow from mill ponds into the salt tide waters, and which are so numerous, and their sources so interlocked, that there is no spot safe, by remoteness of position, from these combined effects of mill ponds and salt marshes. It is therefore sufficiently evident why that otherwise finest part of the state, for agricultural improvement and profit, should stand among the lowest in both these respects. Yet this part of Virginia might be rendered both healthful and fruitful, and the delightful region which God has permitted it to be made, if man would accept and avail of his bounties, by merely using half the expense for improving, which has been lavished to inflict pestilence and poverty on the country.

These statements and expressions of opinion will be unpalatable, if not offensive, and perhaps may subject the writer to the charge of being willing to injure the residents of the

region for whose relief in this respect he is most anxious, and of the facility and cheapness of obtaining relief, by the use of proper means, he feels most confident. If the exposure and probing of the ulcer be never so painful, let it be remembered that it is done solely for the purpose of seeking for, and applying a sure remedy.

Having presented these views of the origin, action and effects of malaria in this country, I can better exhibit the progress of the causes which I believe to have operated, and which are still continuing to operate, to produce the change from a healthy to an unhealthy state.

When our ancestors first reached this shore, nearly the whole country was in a state of nature. The savages had cleared for cultivation but a few fertile spots on the banks of the rivers; all the rest of the land was under one great forest. The streams had not been obstructed by the cutting down of trees across their beds, (by which, in many cases, streams have since been choked, and swamps thereby formed, or greatly extended.) No dams had obstructed the free and regular course of the streams, and therefore no great artificial floods were formed. The soil not having been cultivated, was not exposed to be washed away by the rains into the rivers. The waters therefore were generally clear, instead of being generally muddy, as since all these circumstances have been changed. In this former state of things there could have been existing but few sources of malaria.

The first sources formed by the civilized settlers, was in making ponds to supply water-mills. But while these were yet few in number, the constructers of course chose the best and most unfailing streams; and the ponds were also for a long time surrounded by dense and tall forests. Such hilly land as the margins of the ponds would certainly not be brought into cultivation, while so much that was far better, and easier to till, remained unoccupied. Hence, such ponds produced but little malaria, and that little was warded off from the settlers, or taken up by the forest growth. The general wooded state of the country, also, for a long time, rendered the supplies of water more regular, and prevented the severe droughts, which would have altered greatly, as is usual now, the levels of the ponds.

The clearing, cultivation, and consequent washing of the lands of the upper country, greatly increased the muddiness, and quantity of alluvial deposite of the rivers, and thereby increased the marshes both in breadth and in height. More mills continued to be built, and on streams worse for water power, as the choice became less open, and the mill-mania began to grow; and, in the general, each successive construction of a pond was less productive of profit, and more productive of disease, than its predecessors. The number of mills not only continued to increase, and is increasing to this day, and in the oldest settled parts of this state, as well as the newest, but gradual changes also took place in the condition of the old mills which greatly increased their fitness to produce disease. By the long continued deposite of mud from the streams, and the washing of the now cleared and tilled hill sides, the ponds became more shallow, and the waste of water by evaporation therefore became greater; while the supply was lessened, in consequence of the extended clearings of the great forest which had before covered the whole country. To remedy the increasing deficiency of water, the owners of old mills who were not prohibited by circumstances, raised the level of their ponds; which by increasing their surface and their contents, still more increased the daily evaporation, and also the violence of floods, and the variable height and surface of the water; all of which again combined to increase, still more than before, the product of malaria. The consideration of the progress of all these circumstances, and their bearing on each other, will serve to explain why a particular neighborhood might formerly have been healthy, though having two or three mill-ponds within or around it; and why it might gradually have become very unhealthy, in the course of time, by the malaria produced by the ponds of the same mills, or perhaps by the addition of one more new pond, to the former number. But, in such cases, so gradual would be the general change, and so irregular and variable the attacks and virulence of the autumnal diseases, that the sufferers would not attribute the change (even if they admitted it to have taken place,) in their average degree of health, to causes which had so long existed, without being charged with doing mischief; and in which causes no change of condition had been observed. Add to this, that self-love makes every man reluctant to believe, and to confess, that his own farm, or his own neighborhood, has become more sickly; and the change for the worse is attributed to transient causes, until the former state of things is almost forgotten, and the present is received as if it had always been the usual condition of circumstances.

During all this time, other causes were working to produce other nurseries of disease, and impediments to agricultural products and improvement. These were the obstructing and diverting the courses of streams, and filling up their channels, and thereby making swamps where they did not exist before, and, where they did exist, making much more swampy and pestilential than before. These injurious acts of individuals, aided and made protential by the legal policy of the commonwealth, and their effects, were stated in the previous section, and therefore need no more to be said of them here.

But though the tendency of the general changes in the physical condition of the country was to increase the causes of autumnal diseases, there were numerous particular exceptions, in works serving to promote health. Of this kind were the opening and straightening of the choked channels of small rivers, and many large streams, in the hilly country, where there was enough descent to enable each individual proprietor of flooded low ground to relieve it by operations confined

to his own land. The effectual drainage of much land of this kind has produced so much benefit to health, as in many cases to balance, and even exceed the increasing pestiferous effects of neighboring mill ponds. Such facts would be taken, by most persons, as proofs that the increase of mill ponds had not increased disease.

Such benefits have been produced by the gradual draining of the extensive low ground of Gloucester, which in its former and natural swampy state, must necessarily have been an abundant source of malaria. This change, together with other circumstances, has operated to render Gloucester as free from bilious disorders as any part of the tide water region —save the adjoining county of Matthews. The remarkable general state of healthiness of all these very low lands, at present, as well as the exceptions, and evident causes of the exceptions, furnish the most clear and important evidence of the truth of the position, that mill ponds, and floods of fresh water discharged over salt marshes, are the great sources of malaria in Virginia. There are but few fresh water streams discharged on salt marshes in these two counties, and not a pond mill on the low grounds, nor indeed in the whole county of Matthews, save one on its border nearest the high land. The facts presented here alone, will prove the great and certain benefit to be obtained by even a partial and imperfect avoidance of the action, separate and combined, of these two great sources of malaria.

More lately, and very recently compared to the anti-malaria processes just referred to, there have been commenced, and are now in rapid and increasing progress, other and more effectual means for the same end. These means are the marling and liming of much of the lower part, and previously the most sickly part of Virginia. The effects of these means in improving health have been treated of elsewhere, and do not belong to the subject now in hand. But they are thus slightly mentioned, because proper to be borne in mind, as among the circumstances which have operated and will still more operate to counteract, or to counterbalance some portion of the disease-producing action of swamps and mill-ponds. Happily, the applying of calcareous manures required not legislative permission, nor the consent and combined action of many individuals; and therefore it has proceeded as fast as the intelligence and the correct views of self-interest of each individual farmer have prompted—and so rapidly, that of late the districts partially marled have been becoming manifestly more healthy in general, although the malignant action of the nearest swamps and mill-ponds may be in no degree abated, or may be even gradually increasing. Such salutary effects of calcareous manuring, however beneficial and extensive, and however well serving to compensate for the still existing producers of malaria, do not at all lessen the action and evils of the latter. But we may infer from the fact of this relief, derived from another and very different source, how greatly effectual would be additional defences directed properly against the still remaining producers of malaria. Calcareous manures act to prevent or greatly lessen the comparatively slight formation and exhalation of malaria from all the drier lands to which these manures are applied; and it may happen in future time that all the arable land of lower Virginia may be thus improved in relation to health, as well as in fertility. But extensive and beneficial as will be such effects, the more circumscribed but far more operative sources in mill-ponds, and the grounds subject to be overflowed by them, and irreclaimable swamps, will continue to be as productive of malaria as heretofore.

Even if the public mind had been prepared for a full legal reformation of the police of mill-ponds, and for the laying dry all such as are nuisances to health, there would be no accompanying necessity for injuring the private interests of mill-owners, nor of causing material loss or inconvenience to the customers of the mill. In the first place, in justice to the vested rights of the millers, (however unjust to others, and injurious to the public may have been the original creation of their rights,) I would advocate full compensation being made for every sacrifice of value in their ponds, which should be required and compelled for the general benefit. But *not more* than full compensation for all value thus destroyed should be granted; and many of the fever-breeding ponds have really no pecuniary value to their owners or to the public; and most others may, to greater advantage, be supplied with water by canals, instead of by ponds. Even if one-third of all the mills should be thus put down entirely, these would be such as now always fail in dry seasons; and the more permanent and regular supplies of water, which all the remaining mills would receive from the canals substituted for ponds, would render them competent to furnish the whole country with meal, with regularity, certainty, and in abundance, and therefore more suitably and conveniently to the consumers, than all the mills, good and bad, now in operation. By an important innovation in the law in regard to mills, (enacted March 2d, 1826,) every owner of a mill is authorized to cut a canal through the lands of other persons, if required by the nature of the locality so as to substitute the pond by a canal. Before this amendment of the old law, no mill-owner could effect any such improvement, unless in the rare case of his own land extending under the whole course of the desired canal. The privileges offered by this new provision have already been availed of in many cases, in Charlotte, and the neighboring counties, and to great advantage in regard to health as well as to increased power to the mills, and great value gained in the rich drained bottoms of the ponds being put under cultivation. Slow as such lessons are usually learned, and slow as new agricultural improvements are brought into extended use, this highly beneficial and profitable improvement cannot fail to be adopted generally in the course of time. The main obstacle to the early and general substitution of canals for ponds, wherever the

change is practicable, is the absurd legal distribution of rights in the mill-ponds and the land which they cover, as stated above; one person being vested with the perpetual right to keep the land overflowed and worthless, while others have the right of property in that land, to be exercised only in the never-expected event of the owner of the pond drawing it off and draining the rich bottom; and that for the gain of others, more than himself. Now if no better mode were available, I would get rid of this absurd conflict of rights, by vesting the full property in the land covered, in every mill owner who would draw off the pond; or if he did not avail of the privilege offered, the land should be given up to its former owners, or to any one else, who would construct a canal, and thereby secure to the use of the mill an equally good supply of water-power.

Whenever the legislature is prepared to act decisively on this whole question, there will be before them a subject for the internal improvement of Virginia, far more important in beneficial results, than the roads and canals which have cost millions of dollars to the treasury; and yet which will be cheaper, compared to the profit to be certainly counted on, than the most humble or contemptible job yet carried through for private benefit by public expenditure and ostensibly as a public improvement.

If the importance of this general subject were duly appreciated, its investigation would become an object of the care, and be conducted at the expense of government. If the legislature of Virginia (for example) would institute a "General Board of Health," or "Commission of Sanitary Police," for the purpose of investigating the subject of malaria thoroughly, and of reporting the sources and proper remedies, the body of evidence which would be collected, and the after-results, might be made worth many millions of increased pecuniary value to the state, besides the far greater benefit to be produced to the health, the physical and moral qualities, and the general happiness of the people. At any possible cost of such an investigation, and of the system of measures founded thereon, the public improvement and benefit produced thereby would exceed the expenses a hundred-fold.

PRUNING FRUIT TREES.

Brighton, February 1, 1843.

The time and manner of pruning fruit trees are various according to the different opinions of cultivators of fruit. Yet there is a right and a wrong to every thing, and I cannot account for the adopting of March for the right season, as many do, for pruning, on any other ground than it is a more leisure time.

Now it is a given point, that the best time is when the wound caused by pruning will heal quickest and soundest; and will a wound on a tree or any where else, heal the quicker for standing exposed to the weather for a month or two? If not, why prune until the tree is in a growing state. When I am engrafting in March or April, and it so happens that I *head in* a tree, as it is termed, and I do not set the scions for a week or so, I find the limb is affected in two or three inches, and it must be cut again. While a limb cut in June, can be set by sparing it, as it is not affected in more than the one-eighth of an inch.

It will be foundu pon experiment, that a wound made on a tree in March or April, will look black as soon as the sap begins to flow, and that the sap will ooze out until the leaves have put out so as to receive it; while a wound made in June will remain white and immediately commence healing. And a tree that has been broken by being loaded with fruit, or otherwise, while the tree is green with foliage, the wound will look white, and the wood remain sound; while one broken in the winter by snow, or from other cause, will look black, and incline to decay.

I have found some good farmers who having observed that March pruning was attended with these bad effects, have pruned in December and January in order that the wound may get so dried as to prevent the sap from oozing out when it begins to flow in the spring; which reasoning is correct. But still the pores of the wood are all open for the reception of air and water for six months before it begins to heal; so that the wood will be completely dead in an inch at least, and it will take one summer, if not two, for the new wood to get up to the edge, and cover the space where it has died by the effects of the winter.

It has been my humble lot to spend the most of my time in the spring and fore part of the summer, in engrafting and pruning fruit trees, and my experience goes to prove that the best time for pruning is when the leaves are full grown, and the tree is in a vigorous and growing state. For at this season, when the sap has been spent in the foliage, and the pores of the wood are filled, so that when the limb is taken off the sun and warm weather will dry the end of the limb and close the pores of the wood against the weather, and the sap will keep the limb alive to the very end, and the healing will be perceived immediately.

Dead or decayed limbs may be taken off at any time, but if the limb is large the wound should be covered with something. I use my grafting composition if the limb is small; if large, I generally use paint. Early pruning should always be avoided, for it is a natural law that too much of a good thing is good for nothing; and if profusely used, it invariably proves to be an evil. In pruning young trees we should always try to set the top where we want it, as to height, and carefully thin it enough, but not so much as to make it flaring, for when the limbs naturally incline down, if they break there will be nothing above to form a top.

A round top should be formed by leaving some of the middle limbs to run up and form a kind of second top, and give a tolerably well shaped tree, although you accidentally lose some of the lower limbs. In pruning big trees, we must be governed by the profit of

the tree, not by our fancy; for it is better to have an ill-shaped sound tree, than a half decayed handsome one. Therefore trim off the dead wood first; then the sprouts, excepting such as you may want to make limbs to fill spaces caused by previous bad pruning, decayed limbs, accidents, &c. I frequently take off limbs that are covered with moss, and let the sprouts take their places, but never a whole top at once, for in my humble opinion, it is too heavy a check upon nature. A. PIKE.

Boston Cultivator.

IMPROVED CULTURE OF COTTON.

Planter's Retreat, Ala, Dec. 26, 1842.

MESSRS. GAYLORD & TUCKER.—"Condition and circumstances," says the Cultivator, "should not control us. We should mould them to suit our wills." A truly laconic sentiment this; the grand importance of which I have well and long since considered. And though I acknowledge, to the fullest extent, the force and justice of such decisive resolve as a governing principle, and regard it as the very "*sine qua non*" to certain success, in the practical operations of the agriculturist, yet he must be a Lacedemonian, indeed, over whose stern prowess circumstances may not occasionally exercise a leeward influence.

Engagements of an urgent character, and without my control, have caused the delay of this number, which, with the advanced stage of the season, render it necessary that I change the order of my original design, as previously indicated in communicating with you upon "the improved culture of the cotton plant;" and instead of giving you the principles and philosophy of the system, &c., according to my views of the peculiar characteristics of the plant, under the various circumstances of soil and culture, I propose devoting this paper to "the details of the modus operandi by which my experiments have been conducted, together with the character and quality of the soil, &c." for the timely convenience of those kind friends, and other gentlemen, in the cotton region, friendly to agricultural economy and improvement, who may have exercised only faith enough in the system, *acting wisely*, to make the experiment.

In commending this improvement, gentlemen, to the planting interests of the country especially, and previous to going into the details of its practical application to the culture of cotton, permit me to call the considerate attention of your readers in the cotton region by a few brief remarks to two very obvious facts that exist, palpably destructive to the best interest of the cotton planter—the direct effect of the present system of culture. In the first place, I remark, that under the system of the country, the maximum production of cotton, *at a ruinous cost*, has equalled that of its consumption; which is generally admitted, I believe, to be the principal cause of the low prices of the article, which general admission also agrees that such prices pay *very little*, if *any profit*, upon the immense capital vested in its production. I remark, again, upon the disproportionately large amount of *inferior and poor* cotton thus produced, as compared to the good, which, upon the authority of both merchant and planter, may be safely set down at from three to four bags of poor, to one bag of good cotton. This fact, so abhorrent to the natural order of all vegetable perfection, produces a state of feeling and an influence in the cotton market prejudicial to the real value of cotton, and consequently to the interests of the planter. These are plain matters of fact, and must have excited the attention of planters in some degree, especially the latter, which I suppose to have existed to a very injurious extent for at least the last quarter of a century.

To meet both these difficulties, and to convert them in a direct reverse ratio, into sources of profit, constitutes but a part of the advantages which this improvement offers to the cotton planting interest of the country. It proposes to meet and obviate the former difficulty, by producing, as previously stated, the present and necessary amount of cotton, with but *one-third* the cost or capital now engaged in its production; furnishing thereby to the planter a *direct and net profit* of over 100 *per cent.* upon the present market price. To illustrate and prove this position will be a part of the object of another number. Again—by subjecting the cotton plant to this system of improvement, which favors its natural arborescent growth, and the more perfect developement of its staple and great profligacy, the latter difficulty is obviated and the preponderance changed, as clearly shown by my experiments, in favor of an infinitely superior staple: thus the planter receives nearly an entire crop of strictly prime cotton, upon the influence of which the market price becomes established, and its tendency favorable to the planting interest. I have not room here to do more, at present, than merely to call attention to these facts. I now proceed to the immediate object of this number.

This improvement, when it shall have attained its highest state of perfection, contemplates the "*system of rotation*" in planting, under which the land designed for cotton lies the previous year in the state of fallow, which is found by experience most favorable to the growth and fruitfulness of the plant. I commence the preparatory operations for planting about the 1st of March, by spreading upon the land *broadcast* two to three hundred bushels of manure per acre—light stock yard and stable compost. I then run off the land in rows of three feet with a scooter plough, opening a good furrow some three to four inches deep; this done, I take a large size shovel plough and cross the scooter furrows by rows, running at right angles, of five feet wide. I am now prepared to commence manuring in the hill, having first ascertained that I have 2940 hills on each acre, which will require, by giving each hill a half gallon of manure—same kind of compost—184 bushels nearly, which I haul on the land in a cart, first graduated to a certain number of bushels, and with spades, likewise prepared for the purpose, I deposite the requi-

site quantity of manure in each hill. By this means, which in practice will be found simple and expeditious enough, I give four to five hundred bushels of manure to each acre—*an infallible insurance* for 5000 lbs. of a superior staple per acre. As the manure is placed in the hill by rows, the wide way, a short distance in advance, a *good plough hand* follows with a turn plough, which should run into the soil from *six to eight inches deep* at least, and turn well, with which four furrows are thrown together on each row: thus fixing the half gallon of manure in each hill, entirely within the *region of constant moisture.* This gives me a fine, large bed, and well broke, to lie until at or about the first of April, when the cotton seed should be planted. This is done by first opening the bed as shallow as possible, with some instrument such as that described by M. W. Philips, Esq., in the March number of the 9th vol. of the Cultivator. This I prefer to any other instrument of the kind I have ever yet seen, since its depth of furrow may be graduated to a positive certainty so as to avoid disturbing the manure in the hill; it should not be opened out deeper than one inch. The bed thus opened, and the seed previously rolled in leeched ashes or sand, which answer very well, though I prefer a compound of two parts of ashes to one of common salt, made moist with water; the seed, well rolled in this, are carefully dropped over the manure. Eight to ten seed in a place will answer to secure a stand. There will be no difficulty in dropping the seed over the manure in the hill, when it is recollected and observed that upon the unbroken space of some two feet between each row, the scooter furrows will be found an unerring guide to the manure in the bed at distances of three feet. The seed thus dropped I prefer to have covered with a hoe, *lightly and carefully;* bearing in mind this golden truth, that "a crop well planted is half made." Immediately after planting, the middles or unbroken balks should be ploughed out. The crop of cotton thus planted, which should not exceed *three to four acres* to the hand, may be performed in good time and well done. In a few days, say nine to twelve, the cotton will be up, presenting a most healthy and thrifty appearance. The next operation to be performed, as early as possibly convenient, is to plough out the middles *well*, the wide way, with a good shovel plough, having first run around the young plant with a scooter plough. The hoe hands follow and thin the cotton down to two stalks, giving it a small quantity of soil. This operation *well done*, the plant is at once placed beyond all danger, since its tap-root will now have taken such hold upon the manure below as to enable the plant to outstrip either grass or weeds, having yet to spring up.

Under this treatment, the *time-consuming* and worse than useless operation of *bar-shearing, scraping* and *chopping out*, are saved, as much to the benefit of the tender plant, as to the interest and economy of the planter, in despatching the *hurry and push* at this stage of the crop; and at the conclusion of this first working, I have my cotton growing off and doing well. I have now no further use for a plough in its subsequent culture, but use the *sweep*—a kind of horse hoe—I call it a sweep, in the absence of a more appropriate name. * * *

The great and singular advantages of the sweep over all instruments of the plough, harrow, or hoe kind that I have ever used, are these,—that it will *kill* a greater quantity of grass and weeds in a given time, and *do less injury to the surface roots* of the plant, *so essential* to its *progressive* prosperity. The hoe hands, following this instrument, thin the cotton to a stand, *one stalk* in a place, and draw up a small quantity of soil to the standing plant. The entire subsequent culture is performed with the sweep and hoe, which should simply scrape and pulverize the surface, so as to kill any grass and weeds that may appear, and allow a *free circulation* of atmospheric air to the fibrous roots of the fruiting stalk, requiring at this *critical period* all the aid and nourishment that culture, soil and atmosphere can afford. By the first of July my cotton stands from 5 to 6 feet high, and I have it topped by the 10th at farthest, after which I run the sweep once more through it, and the hoe if necessary, to remove any grass, that may have sprung up immediately above the stalk. After this, and by this time frequently in places, the cotton will become so much interlocked, and the ground so shaded, as to keep down all other vegetation—yet it may be found necessary again to chop about in places with the hoe, when the cotton may not have locked so early. This should be invariably attended to. This brings us again to the season of harvesting the staple.

Let no planter prejudge and reject this system, upon the score of simplicity, supposing the process too simple to accomplish the object proposed; first, act wisely, make the experiment, and try it. Strictly follow this plain and simple process, and if the land does not reward your pains-taking, with *five or six fold the quantity per acre*, of a *superior staple*, than has at any previous season been taken from it, in its natural state, I will present the experimenter with *one bushel* of my *improved seed*, with which to perfect the experiment. At another time I propose devoting a paragraph to the importance of *selecting and improving* cotton seed.

It will be observed that manuring constitutes a large item, in this system of improvement, a source of revenue too much underrated by planters, and consequently too much neglected, because the subject requires a little extra attention—which attention is so essential to the prosperity and well-doing of a farm. Nor, gentlemen, have I seen any thing better said, or more true, than I find in the sentiment, under the head of "*a few queries*" in the last December Cultivator, where you remark, to the planter and farmer: "In your manures is your *gold mine*, more valuable than any of the Carolina ones, and you should be anxious to increase them accordingly." But I hear some planters say—"it is impossible to produce so much manure"—this is, however, the result of inexperience, and the want of *determination.* I am entirely convinced, from my experience in making manure, that it is not

only practicable, but a perfectly easy task, to prepare upon every plantation in the cotton region, great or small, 1500 *bushels* of an excellent article of compost, per annum, to the hand—at a cost of less than two cents per bushel—by the assistance of the stock of horses, cows and hogs, upon properly arranged lots. This is done by having the lots well littered, by throwing in pine straw, in large quantities and frequently, or oak leaves, where the pine straw is not to be had, with cotton and corn-stalks, &c., and occasionally haul and scatter upon the litter, a few loads of muck or marl, one or both of which may be found on or near every farm in the country; upon these lots, pen and feed your stock every night. The manure thus prepared, should be collected in pens or pits, three or four times during the year, after heavy falls of rain, and the lots replenished with pine straw, &c.—by this means a very large amount of manure is collected during the season, and that too, at an inappreciable cost. Again, we have another difficulty; there are but few persons who believe that pine straw can be converted into manure; for the benefit and information of such, who may read this, permit me to quote a single sentence from Liebig's celebrated work upon agricultural chemistry. "The bark and foliage of oaks contains from 6 to 9 per cent of potash. The needles of firs and pines, 8 *per cent.*" But it is not on account of the potash exclusively, that I prefer pine straw, to all other vegetable matter in the preparation of manure;—since it possesses another invaluable quality above all others, in absorbing the juices of the manure, which are thus saved from evaporation, and readily applied to the land. I doubt not but a single year's experience will convince every intelligent planter of the innumerable advantages of this improvement, and its perfect adaptation to the culture of cotton and other crops.

I will now close this number by a very few remarks upon the character and quality of the soil upon which my experiments have been conducted. It is high ridge land, readily recognized, and its quality distinctly understood, in our southern country, under the name of "*forked leaf black jack, pine-barren,*" a deep, porous, sandy, superstratum, lying under a tolerable good clay, at a distance of 2 to 3 feet below the surface. A true picture of nature, and naturally poor enough. This land, under the treatment above detailed, grew my cotton, from which I have gathered a greater number of pounds per acre, (indeed almost double,) than I have ever seen recorded, is in its natural state inferior to the average quality of cotton land, by at least one half. I might refer you, if necessary, to more than one hundred gentlemen, planters from Georgia and Alabama, who have examined my experiments carefully, and several of them, at various stages of its growth, and with one general consent, pronounced it a fair test, and a great improvement. I have, from several stalks that grew on the three acres, in the proper places, taken 3½ to 4 lbs of cotton, *carefully weighed.* In the perfection of this improvement, yet in a state of great crudeness, when every stalk upon the acre, (2,940,) *shall mature equally well,* what may I *reasonably* calculate to gather?

"————Nil desperandum,
Possunt quia, posse videntur."

N. B. Cloud, M. D.

Albany Cultivator.

WHITE CARROTS, AS A FIELD CROP.

We have elsewhere than in our paper had frequent occasion to call attention to this valuable variety of roots, and we are glad to find, in the N. E. Farmer, a notice that induces us again to speak on this subject. It states that B. V. French, Esq., near Boston, Mass., raised this year over twenty-two tons per acre, on ground not particularly well prepared for roots. He attributes his success principally to *subsoil ploughing* his land, in the spring of 1841. In addition to its being proverbially a great yielder, it possesses another important advantage in deriving a great portion of its nutriment from the atmosphere, and the beet-like protrusion of its roots above the surface, render it much easier to gather than the ordinary carrot. We have cultivated them for years, and speak advisedly on the subject.—*American Agriculturist.*

WEARING FLANNEL.

Health to the farmer, as to all others, is a consideration of the first importance. But we find him more careless on this point than almost any other class, probably because his habits and pursuits best entitle him, by the immutable laws of nature, to the largest share of its blessings. Active exercise in the open air, frugal regimen, and the absence of many causes of mental disquietude, are all favorable to the maintenance of health. Still there are many errors unwittingly committed, which, if corrected upon true philosophical principles, would tend to the lessening of human ill. With a view to correct one or two errors which I conceive to exist, I beg leave to suggest a few hints respecting the necessity and proper mode of wearing flannel.

Flannel, I consider, should be worn at all times; and that wearing it promotes individual comfort. In this latitude, it is probable that, to the majority of persons, its use the year round, would be more agreeable than otherwise, if the texture of the material be changed to correspond with the season. Many, however, will prefer discarding it in summer, and this may at any time be done with impunity, by others than invalids.

The idea of flannel rendering its wearer effeminate, has been prejudicial to its free use, and to health. The covering of all animals, excepting our own species, is adapted to their necessities, sufficient to afford them protection from the ordinary vicissitudes of the weather. That we require clothing, all agree; let us, therefore, imitate nature, by using a sufficiency to gratify our feelings of comfort, and

the opposite of effeminacy will be the consequence.

Another false impression exists as to the danger of leaving off flannel, when it becomes desirable to do so. When the weather is such that the wearer would feel better without it, no fear need be apprehended in relinquishing its use at any moment. So far indeed from such being the case, I cannot too strongly recommend the practice of laying it aside at night, and sleeping in a cotton night shirt. The primary object of wearing flannel under clothing, is to preserve the body at a comfortable and uniform temperature. Wool being of light weight and an imperfect conductor of heat, is the best material to convert into such garments, but at night it is not required for the sake of warmth.

One of the benefits of flannel is the friction it excites on the skin, determining the blood to the surface and promoting a general circulation of the vital fluids to the extreme parts of the system. Now by wearing it constantly, night and day, the cutaneous surface becomes familiarized with its effect, until finally its influence as a counter-irritant is gone. If laid aside, however, for the night, such is not the case, as all can bear witness who are in the habit of doing so. Another argument in favor of the practice, may be derived from its cleanliness. The garment being suspended in the air during the night, becomes ventilated, and in a measure purified, and in warm weather, when moist from the perspirable matter, is dried.

No fear of "catching cold" need be entertained in adopting this plan. The timid may be confidently assured that those who wear flannel during the day, and during the day only, are much less obnoxions to all diseases of the chest.

Many good and sufficient proofs of the general benefits of woollen next the surface might be adduced, but they are such as have been frequently presented to the public. My object in this brief essay has been to draw the attention of my agricultural brethren, to one or two points which I regard as of considerable importance, and which though well established among the intelligent of the medical profession, are not so well known as they should be, to the people at large. MEDICUS.

Farmers' Cabinet.

RUST ON WHEAT.

FRIEND PLEASANTS—Permit me to offer a few remarks on the subject of rust on wheat. I shall not make them with the object of controversy, nor even with the expectation of doing any considerable good. I merely desire to give you my opinion, derived from much reflection and examination.

Rust on the wheat plant, and on all other plants, is a regularly organized vegetable growth, of the fungus tribe. To produce this plant, the concurrence of several elementary principles is necessary, to wit, the existence of the seed, the proper temperature and atmospheric moisture, are the most essential. When all these elements concur, and no preventive exist or be administered, rust will certainly be produced—just as certainly as will a crop of Indian corn result from the planting of the seed in good soil with proper cultivation and a favorable season. Rust on wheat is no accidental formation any more than is the wheat plant itself. The seed of rust exists at all times in the wheat plant, and should the degree of temperature and moisture of the atmosphere necessary to the developement of the plant occur at the proper time, then will rust inevitably be produced. If this theory be correct, (of which I have no doubt,) the remedy or preventive of rust must be sought for as follows: Can we find any thing that will destroy the *seed* of rust in the *seed wheat*, without injuring the wheat itself, and thus prevent rust? I apprehend that such a preventive will never be found. The seed of rust exists in the very nature of the wheat itself, and cannot be destroyed by any thing that shall not destroy the wheat itself. Can we suggest any remedy that shall destroy the rust on the wheat plant, or prevent its developement. I believe this may be done, but I fear the remedy would be too expensive. If well pulverized air-slaked lime be spread over the wheat plant as soon as the rust appears, I have no doubt it would effectually destroy the rust. If this were done when rust is apprehended, I have little doubt it will prevent it. But, to be effectual, the lime must be applied to the rust itself; and this would be a great labor. Probably dusting the finely pulverized lime over the wheat while the dew is on, so as to make the field look white, would stay the greater part of its ravages, and save a fair crop. All other remedies are beyond our control. We cannot cool the air nor dissipate the moisture. If we could raise a high wind at the moment when the rust was about being developed, all would be well. But there is a way in which we may generally escape rust, though not always, and that is, by sowing the earliest wheat. I mean that which ripens earliest. If the land be well limed, and is well situated, and otherwise in good condition, warm and generous, the early kinds of wheat will generally be ripe before the peculiar condition of the atmosphere necessary to the growth of rust happens. When this condition of the atmosphere happens early, then even early wheat will suffer; and for this there appears to be no available remedy. It is well known here that limed land is not a preventive of rust. Liming land *may* prevent it, it is true, by the influence it certainly exerts in warming the soil, and thus bringing forward the wheat to earlier ripening; but its effects in this way are not sufficient with late wheat to save it. One of our most extensive wheat growers has just informed the writer, that late wheat on his most heavily limed land was just as subject to rust as that on his neighbor's land, where no lime had been applied; but the early ripening wheat generally escaped.

Here let me anticipate an objection that will be urged against the opinions just advanced. If rust be the result of this combination of temperature, moisture and seed, it will be

asked why all parts of a field or a neighborhood are not equally affected. The answer is, that currents of air may pass through some portions of a field and not others, and thus save those portions. In times of atmospheric quietude, damp air will settle, and, as it were, stagnate on some portions of a field, while other portions will be more freely ventilated. At some times the wheat on the elevated portions of a field will be rusted; at others these places will escape, and that on the low places will be affected; and at others again all places high and low will be equally injured by rust.

Excuse a few more remarks on the nature of rust. You, Mr. Editor, will remember the disease called *muscardine in silk-worms*, a microscopic representation of which was published in the Silk Journal a few years since. That disease is of the same nature as rust in wheat. It is a fungus. So also is mould on bread, cheese, and every thing else; so is mildew; so also are the ergot or spurred rye, the rust on rose and other leaves, the dry rot in timber, and, in fact, every similar formation of every kind, and wherever found. Writers on *rust* in wheat generally treat it as if it were some accidental deposite or formation. If there is any one word in our language that ought to be discorded, that word is *accident*. In the nature of things there can be nothing accidental. Every thing must necessarily have an adequate cause, and a natural cause too. Rust in wheat is said by some to be caused by the bursting of the sap vessels, in consequence of an over supply of sap; by others, by the deposition of matter, by the vapors of the atmosphere; all looking upon rust as some dead or inorganic matter that has accumulated on the plants and poisoned them. But it is not so. Each particle of rust is a regularly organized plant, produced from its own seed. I apprehend that the cause of the bursting of the sap vessels will be found to be their complete occupation by the *rust fungi*. Certainly the healthy juices of the wheat plant, even if they did burst the vessels, would not, on being evaporated, produce what we call rust—they would be much more likely to produce sugar; and there is not enough of sap lost in this way to injure the wheat, as rust always injures it. If the temperature and moisture of the atmosphere, and other circumstances that usually produce rust, were always to occur, then we should just as certainly always have rust in our wheat as we should have wheat itself. And so it is with all kinds of fungus growths. There is no fungus that we cannot produce at pleasure, simply by producing that combination of elementary principles necessary to their growth. For example, let any gentleman tell his gardener that he wants mushrooms for dinner that day two weeks, even though it be in midwinter, and he will certainly have his mushrooms, if his gardener understands his business. Do we not know that by confining cheese, or bread, or any other similar article, in a close damp place, it will get mouldy? Place damp clothes in a close trunk in warm weather, will they not be mouldy? We are too apt, on looking at small things, to consider them things of accident. For example, how many are there in the world that consider the speck of mildew that has *accidentally* attached itself to some garment, any thing more than inert matter? How few there are that consider it, as it really is, to some infinitely small animals, *a large forest of trees and shrubs*, bearing, each atom of it, all the forms of regularly organized vegetable growths. Take the smallest speck of mildew and place it under a moderately powerful microscope, and it will appear like a grove of palm trees, with lions and tigers and elephants capering about among them. In truth, each mite of this mildew, and of all such formations, is just as perfectly formed, and is endowed with the same organs and reproductive powers, as is the giant oak; it is, in fact, a created being, just as perfect in its way as man himself, and is the work of the Creator himself, as are all things, mite or mammoth.

GIDEON B. SMITH.

CULTIVATION OF CORN.

Goochland. February, 1843.

TO THE EDITOR OF THE FARMERS' REGISTER,

—Nearly every farmer has his own peculiar mode of cultivating corn; and if you think a description of mine will be of any service, I am willing to place it at your disposal. My plan is to prepare the ground, as near the time of planting as practicable, not by ploughing flush, but by listing. Three furrows are sufficient to form a list, the earth from the two last to be lapped immediately over the first, so that no hard or unbroken space may remain. When the lists are completed, they are checked at suitable distances. I prefer three feet each way, with one stalk or plant in a hill; and to plant the first of April or as soon thereafter as possible. Early planting is very desirable. My mode of cultivation is as follows: As soon as the young plants have fairly made their appearance, I cause the wing coulter (an implement with a narrow iron wing extending into something of a share, attached to a new ground coulter, which works deep and leaves only a small furrow) to be run very near the young corn; even if the plants are a little loosened, so much the better. The first ploughing is with the lists; and the whole intermediate space is broken up, close and deep—as deep as one horse can draw. When this operation is finished, the next thing is to plough the land crossways; and so on alternately, with the same implement, during the whole course of cultivation, always running as deep as it will go. I continue the cultivation as long as practicable, even until the corn is tasseling and silking; and the ground should have a thorough working, at least every eight or ten days. It cannot be worked too much or too deep. When the soil is kept clean and well stirred, the breaking of the roots is an advantage instead of an injury. The benefit derived from a free admission of the air into the soil is incalculable; and the frequent stopping of the roots causes them to throw out numerous

rootlets which rapidly imbibe the nourishment from the earth. In short, the great secret of raising a good crop of corn is to work early, work well, work deep and work incessantly. Cultivate no more than you can cultivate thoroughly. All beyond that is overcropping, and will not yield a profitable return. Fear not to work in dry weather, provided the cultivation has been conducted with regularity. Stirring clean land, however dry, adds vigor to the growth; but ploughing corn in the grass is death to it, in time of drought. I have said nothing about hoeing: I make no great use of the hoe, but it cannot be entirely dispensed with. I do not permit the grass to be cut up around the corn; it is better to smother it while young, by drawing some loose earth over it. This may be done by following after the ploughs, in the early stages of cultivation; and the soil will be left in a mellow state The suckers should never be pulled up.

I would add a word in regard to the best variety of corn. In selecting for seed, I am governed by the size of the cob, and the length or more properly the *depth* of the grain. It is evident that large cobs have more grain on them than small ones; and the object is to obtain the greatest quantity of grain from the stalk. The twin corn in all its varieties produces small ears; two or three or four of them not being equal to one large sized ear. It is best then to concentrate the product in one ear rather than divide it amongst several. The only disadvantage in large cobs is that they require a longer time to become dry; and it is therefore proper that the harvesting should not be commenced very early, and that the corn, when shucked, should not be thrown in the crib in large bulk. It is best to put it in pens, to remain a few weeks before housing.

It may be asked, "what practical evidence can you give to attest the superiority of your mode of cultivation?" I have been a cultivator of corn for 40 years, and this is the mode I have found to yield the best results, of all that I have tried during that time. My crops are uniformly good, except in disastrous seasons. It is true I am not able to adduce any instance of wonderful product, for my land has not been as highly improved as it should have been. Being one of the "old-time" farmers—an industrious class beyond doubt, but by no means distinguished as improvers of the soil—it is only recently that I have turned my attention to the subject of manure in the manner it deserves. The best that I have done was some years ago, when I raised 14 barrels to the acre on a small field. With proper regard to manuring, I think this quantity may be grown in favorable seasons, by pursuing the plan I have described; increasing, however, the thickness of the corn in proportion as the land is able to bear it. The distances I have stated are for land in tolerable heart.

WILLIAM WOODSON.

GRASS.

In a former number we have reminded our readers of the advantages of seeding on a green sward furrow; we shall now state the mode of ploughing and of seeding which we have found the most safe and profitable.

We turn the furrow over as flat as we can—if there are many rocks or stumps in the way it will be well to have one hand with a hoe to lay flat those sods that the plough did not turn well. After the ploughing is finished a good roller should be used to fit the sods more close, and to prevent their being torn up by the harrow. The next step is to haul on the manure.

As soon as the manure is spread the harrow should follow to mix it thoroughly with the mould of the furrow. The harrow should at first be drawn lengthwise of the furrow to avoid tearing it up; it may then be drawn in a diagonal direction, varying, however, but little from the range of the furrow, and it is not advisable to draw it directly across in any case.

After the ground has been well harrowed the seed may be sown. We find one peck of good herds-grass and three or four pecks of red-top sufficient for an acre; and we prefer to cover the seed by dragging a bush harrow over it. The roller may follow if you choose; and if any loose sods remain on the surface they may be raked into the dead furrows or other low places in the field.

A fresh furrow will be more moist than one that has been turned several days, and seed will vegetate sooner on it. When the season happens to be dry, therefore, it is well to plough but one acre at a time and then throw on the seed.

All farmers know that lands which lie high and have lain in grass three or four years, need some renovating process or they will yield not half a crop. All know how difficult it is to keep all the high land, not in tillage, in good grass; for so much manure is required for planting and raising exhausting harvests of grain, that many fields are suffered to lie fifteen or twenty years, not in grass, precisely, but with something on them that yields no profit. Now the great objects we have in view in the 'New Husbandry' are to keep all our grass lands in such a condition as to obtain good harvests; and to avoid planting so much as to take up all the manure in tillage. To bring our old bound-out mowing lands directly into grass again without the expense and the delay of a three years' course of tillage. We also wish to avoid the risk which we usually run, when we sow grass seed with spring grain, of having it summer killed on taking the grain away.

We, therefore, cut across lots—we turn the furrow over at the very best time for seeding, and we avoid exhausting the soil by crops of grain. We save a green crop under the furrow, and we miss no harvest; we have no fallow for the year. In this way we may give every acre a taste of the manure heap; for instead of giving one field a full dressing two years in succession, we give but half a

dressing, and for one year only; thus we are enabled to go the rounds of our mowing fields four times as fast as by tilling and raising exhausting crops.

The new system admits of ploughing low, cold, wet lands, altogether unfit for tillage, and seeding at once on the furrow. And one great advantage gained by this system is, the land thus seeded will lie more light and will continue in grass two years longer than land which has been two or three years in tillage."

Massachusetts Ploughman.

DRAINING AND MANURING.

It may be safely affirmed that the two most prominent remedies for the improvement of land consist in *draining* and manuring. To have a good understanding of these will go far to the speedy restoration of our worn out lands. I know a piece of land on which a friend of mine has put hundreds of loads of manure, and yet the land looks very poor, arising from the too great abundance of water retained in the soil. As I often see in your useful paper communications on both these subjects differing somewhat from my own views, I beg leave through the Planter to state a few things in reference to both.

1st. As it regards draining. There are many, who, although convinced that water retained in the soil neutralizes the fertilizing qualities of it, yet are deterred from draining on account of the labor and expense, especially if wood is scarce with them. Now, the plan I pursue is certainly the cheapest of any I have yet seen recommended. It is as follows: I dig my drain, if possible, three feet deep, but so narrow at the bottom as just to let two pine poles lie side by side. Within four inches of the bottom, I lay pieces of pine of the same size with the poles across the drain, about four feet apart, on which the pine poles are to rest. These cross pieces are to keep the long poles from falling down on the bottom of the drain, and being four inches from it, give abundance of vent to the water. When I put down the long poles, it is necessary to reverse them, laying the thick end of one with the small end of the other; then, on the top of the poles put the pine brush thick enough to prevent the loose dirt from falling under the poles. I know some have been in the practice of laying down three poles in the bottom, but it does not answer a good purpose long, and in a short time, it is seen that the labor and poles are thrown away; but as long as poles will last under ground, you have a good drain; one that will last longer than a box drain of plank. Moreover, in many places, the ground, through which you cut a ditch, is so soft that no box drain will be of any service, on account of its sinking; this you will see is remedied by the cross pieces, which can be made to stretch far enough across on both sides of the drain, as to resist the pressure; or if you choose, drive a stop down on each side of the drain for the cross piece to rest upon, as I have done many times. If I were near a saw mill, and had plenty of outside plank offered to me for nothing, I would make use of them to lay on the cross pieces; but as every body has pine poles, it is poorly worth while to be hauling slab plank from a distance. I have only to add, that I have made drains of stone, of plank, and of poles, and prefer the latter, for expedition and cheapness. I could say much on the importance of draining land, but as I fear I would be troublesome to you, I shall proceed to the next article.*

2d. On the most judicious method of using manure. I take it for granted that a majority of farmers admit that manure ought not to be deeply covered, but kept near the surface of the earth, and shall not, therefore, give the why or wherefore, only observing, that it is one thing to put manure *near* the surface, and another, to put it on the top, and leave it exposed to the wasting influence of exhalation. If, for example, it be hauled out and spread on the crop of wheat in the spring, or laid on the top of corn, so much of it is wasted by the influence of the sun and wind. Now, I am not saying that no good will be done to the wheat and corn by the above plan of surface dressing; what we are in pursuit of is the most judicious method of using manure. Let a piece of land be taken which has been in corn the previous year, plough it up well—haul out all the manure that can be spared—let it be scattered on this land, and, after oats has been sown, harrow it over with a large harrow, then sow clover and run a heavy roller over it, and when the clover and oats are above the ground, sow a bushel of plaster to the acre, and you have, in my judgment, the best way manure can be used, both as it regards saving it from waste and improving land. The harrow incorporates it with the earth sufficiently to prevent the ammonia from escaping, while every clod is pulverized by the roller, and manure and earth together brought directly in contact with the seed sown.

Southern Planter. J. F.

TO CURE SHEEP-SKINS WITH THE WOOL ON.

Take a spoonful of alum and two of saltpetre; pulverize and mix well together, then sprinkle the powder on the flesh side of the skin, and lay the two flesh sides together—leaving the wool outside. Then fold up the whole skin as tight as you can and hang in a dry place: in two or three days as soon as dry take down, and scrape with a blunt knife till clean and supple. This completes the process, and makes you a most excellent saddle cover. If when you kill your mutton you treat the skins in this way, you can get more for them from the saddlers than you can for the wool and skin separately disposed of otherwise.

N. B.—Other skins which you desire to cure

* We will "trouble" Mr. F. if he pleases, for all he has to say upon the subject of draining; but would suggest to him the advantage of using his full name instead of his initials.

with the fur or hair on may be treated in the same way.—*S. W. Farmer.*

AGRICULTURAL ADVANTAGES OF EAST FRORIDA.

Bath, N. C., Feb. 4th, 1843.

To the Editor of the Farmers' Register.—Having been an attentive reader of the previous numbers of the Register for several years, and having gleaned much practical information on farming from its perusal, and being about to settle in a quarter of a section of the bounty land in the peninsula of East Florida, with the intention of engaging in agricultural pursuits, it is my desire to contribute to your invaluable work, and to impart to you and your numerous readers all the practical information in my power, at some future day, should you think proper to give my communications a place in your journal. Although I am a novice in farming, (having been brought up to the study and practice of one of the learned professions,) I shall nevertheless engage with indefatigable zeal in my new and independent vocation. Being about to locate in a new and fertile territory, which has been entirely overlooked, and whose *agricultural advantages* have been thrown into the shade, it will afford me much pleasure to do away the many misrepresentations and erroneous impressions respecting that unfortunate territory.

From the first settlement of Florida until very recently, it has been overrun and exposed to Indian depredations; and ever since the commencement of hostilities in the latter part of 1835, public attention has been directed to other sections of our country, and emigrants have been deterred from moving to that territory; but now that the Indian difficulties may be considered as over, I have no doubt but the attention of the public will be enlisted in favor of the peninsula.

Having recently returned to my native state, from a tour made over the greater part of the peninsula of East Florida, I hope what I may communicate will be received as correct, and relied upon; for it is not my intentoin to overrate that section of country. I would never call your attention to the following facts and replies, made to many designing persons, who have heretofore opposed the settlement of East Florida.

It has, in the first place, been said, that the war was not over; that emigrants to the country would be exposed to the Indian's rifle and tomahawk. In reply, it affords me much pleasure to inform you that during the last month, after travelling several hundred miles, and, during the greater part of the time, alone, *I did not see* or hear of *an Indian;* and during my peregrinations over the peninsula, I met with hundreds of persons exploring the country, who informed me that they did not see any Indians, and that they did not entertain the least fear from them. In truth, the war may now be considered as over.

It has also been said that the peninsula is a low level country, and that it has proved unhealthy. It is true that, during the war, many of our troops have fallen victims; but this was owing chiefly to exposure, and all the casualties incidental to war; but that the greater part of the peninsula will prove healthy I have not the least doubt. I met with several persons who were residents of the country last summer and fall, and they informed me that they and their families enjoyed uninterrupted health the past season. One will soon be satisfied, on visiting the country, of its fine and salubrious climate; and, from its *peculiar position*, we cannot entertain any doubts to the contrary.

So far from the greater part of the peninsula being a low flat country, it is quite otherwise. Soon after leaving the St. Johns, going west, you approach a beautiful undulating country, which reaches almost to the Gulf of Mexico; and that part of it, in the vicinity of Newmanville, is quite broken, and, in fact, from that place as far south as Tampa, the country is interspersed with beautiful slopes and undulations. On exploring the country from Fort King to the Withlacooche river, I was delighted to see, interspersed among the "high rolling" pine lands, so many beautiful fertile hammocks, which will yield from 1500 to 2000 pounds of the finest sea island or black seed cotton, and two hogsheads of sugar to the acre. The pine lands are among the most productive I have ever seen, and it is said that on being cow-penned one year, they will produce more and richer cane to the acre, than the hammock land. The soil in the best pine lands is from 10 to 15 inches deep, and is light, and of a rich chocolate color, which is called "the mulatto land." The growth in this latter soil consists mostly of the long leaf pine; that on the hammocks consists of all the varieties of oaks, bays, magnolias, sweet gum, the dogwood, grape vines, and last, though not least, the wild orange and lime, the former abounding with the bitter sweet orange, the finest flavored fruit in the world.

In conclusion, it only requires a few years and the erroneous impressions respecting this "land of orange groves and flowers" to be removed, to cause it to be settled up with an intelligent and industrious class of farmers. And to all such, who are desirous of engaging in the cultivation of sugar and sea island cotton, and the raising of the tropical fruits in a a mild and salubrious climate, and country abounding with good navigable rivers, convenient to good markets, I would advise them forthwith to move to the peninsula of East Florida—than which there is not a finer country in the world, and one that holds out greater inducements to emigrants. In my next communication I will call the attention of capitalists to the practicability of cutting a canal from the head waters of steamboat navigation of the Withlacooche, to the St. Johns or the Velunhaha, so as to connect the waters of the gulf with those of the Atlantic. Also give you a description of the large tracts of fertile lands lying on most of the rivers in East Florida, their growth, soil and productions. I remain, very respectfully,

Samuel B. Marsh, M. D.

FERTILIZING EFFECTS OF THE SUB-SOIL, &c.

Pleasant Grove, Md., February 17, 1843.

To the Editor of the Farmers' Register.

—In the January number of your valuable work on agriculture, I see some observations on subsoiling; and I have concluded to offer the result of an experiment which I tried on a part of my meadow with the subsoil dug from a cellar in the year 1825.

In the spring of that year, I planted the ground in corn, which yielded not more than two barrels (10 bushels) to the acre, intending to seed the meadow in grass; and considering this part too barren to produce timothy without the help of manure of some description, I determined to try the effect of the earth from my cellar, which I accordingly did, by covering the surface to the depth of 2 or 3 inches, and partially incorporating it with the soil by means of a shovel plough and harrow. I then sowed the timothy seed, and for ten successive years it yielded heavy crops of hay, when I again planted it in corn, and the produce was 40 bushels per acre, without the aid of any manure. It is now in timothy, and the grass lodges on the ground every year before it ripens. The soil is lighter and more porous, and consequently drier than formerly.

A portion of the same earth I had spread on the poorest square in my garden, which rendered it more productive, and is more durable in its fertilizing effects, than stable manure on the other squares. It is now in strawberries, and the last season, though an unfavorable one, it produced a profusion of fine fruit, some of the berries measuring four inches in circumference.

I will here mention a cheap and durable passway for carts and wagons across ditches in meadow or low grounds, which I have adopted in the place of temporary bridges. When I removed to my present residence in 1821, I found it necessary to construct a bridge of some description over a ditch in the meadow, which I accomplished by means of a hollow log placed in the ditch and covered over with stone and earth. In a few years the log decayed, and I erected a good substantial bridge of 2 inch oak plank. This answered a good purpose a few years longer; but the decay of the sleepers caused this bridge also to give way. I then removed all traces of the bridge, sloped off the banks of the ditch, and paved the bottom with stone broken into small pieces by means of a stone hammer. This required less time and expense, and is preferable as to durability and safety in crossing.

B. B. Pleasants.

[The substratum whose fertilizing effects are detailed above is peculiar, as far as we know, to the district in which our correspondent resides. It is of a saponaceous character, without any admixture of sand or clay, and appears to abound in isinglass in minute division. We have known the substratum of micaceous soils in this region very much to increase the productive power of the adjoining lands. With such signal and permanent benefit as that described in the preceding communication, which is probably not even surpassed by lime, it is matter of wonder that extensive applications have not been made.—Ed. F. R.

RECIPE FOR MAKING GOOD BREAD.

James Roche, long celebrated in Baltimore, as a baker of excellent bread, having retired from business, has furnished the Baltimore American with the following recipe for making good bread, with a request that it should be published for the information of the public:

"Take an earthen vessel, larger at the top than bottom, and in it put one pint of milk-warm water, one and a half pounds of flour, and half a pint of malt yeast; mix them well together, and set it away, (in winter it should be in a warm place,) until it rises and falls again, which will be in from three to five hours, (it may be set at night if wanted in the morning;) then put two large spoonfuls of salt into two quarts of water, and mix it well with the above rising; then put in about nine pounds of flour and work your dough well, and set it by until it becomes light? Then make it out in loaves. New flour requires one-fourth more salt than old and dry flour. The water also should be tempered according to the weather; in spring and fall it should only be milk-warm; in hot weather, cold; and in winter, warm."—*Southern Planter.*

RUTA BAGA.

Messrs. Editors.—In my communication on the culture of the white carrot, I promised to give you my method of cultivating, and the product of my field of ruta bagas.

The piece you saw, when at my farm, contained about three and a half acres, and had lain in pasture a number of years; it was carefully turned over in the fall of 1840; and in the spring following, cross-ploughed and harrowed, and laid out in furrows two and a half feet apart, and planted with potatoes. The knolls, which incline more to sand, were manured with horn-shavings and hogs' bristles, one handful to each set. Twelve rows through the middle were manured with salt mackerel, which were spoiled, half a fish to every set. It was an unfavorable season for potatoes, a severe drought in the summer having injured their growth. The rows manured with the salt fish, I noticed, stood the drought much better than any other part of the field; vines large and of a dark healthy color, when the others were brown and shrivelled, and on digging we found them of a large and even size, and of excellent quality, and the yield far better than any other part of the field.

Last winter, I purchased twenty-six two-horse loads of the refuse of a glue factory, consisting of lime, bones, wool, hair, and pieces of pelt, some of which had lain for two or three years. To twenty loads of this I added forty loads of yard manure, and had it well mixed. In the spring it was ploughed seven inches deep, and left until the middle of June, when the manure was hauled on and evenly spread, which covered all except about three-quarters of an acre, on which was put six loads of the factory refuse, without any yard manure. The piece was then ploughed and harrowed, thoroughly mixing the soil and manure. It was then thrown into ridges twenty-seven inches apart, the same as for the carrots; tops flattened with the roller, and seed deposited with the drill, (Bement's,) on the 18th of June.

On that part of the field where the yard manure was applied, the plants made their appearance on the fourth day after sowing, while on that part where the refuse of the glue factory was put, they showed very few plants until the tenth day, and then they were sickly in appearance, and grew so tardily that the flea devoured them about as fast as they made their appearance. In fact, we were obliged to transplant to fill up vacancies, on the whole three-quarters of an acre—showing most conclusively the ruta bagas require a quick and active manure to give them an early start to get them out of the way of their greatest enemy, the turnip flea or beetle.

On the 18th of July, the cultivator was run between the rows, and they were thinned with the hoe in the same manner as the carrots, leaving the plants from eight to ten inches apart in the drills. In August, the cultivator was again run through them, and they were hoed at intervals when convenient. Nothing more was done to them until we commenced pulling in November. The crop measured 2,355 bushels. I will here remark, that when the salt fish was used the year previous, it was strikingly visible, at some distance; the tops being of a darker hue, higher, and more vigorous, and they continued so through the summer, and on raising we found them thicker and longer in the neck and smaller in the bulb, showing that salt will increase the top at the expense of the bottom.

The greater part of the crop was stowed in a cellar—the remainder was put in heaps in the field, for feeding my ewes when they have lambs in the spring. The heaps are made in the following manner, which I never knew to fail, when they were properly attended to. A trench six feet wide, of any length required, and one foot deep, is dug in a dry situation, generally on a knoll; the roots are thrown into this trench and piled up in the form of a roof. A coat of straight straw of from eight to ten inches in thickness, is put on in such a position as to conduct the water off, if any should reach it. Earth is now thrown on by digging a trench around the heap, beginning at the bottom and going around until the whole is covered. The earth will press the straw, which prevents its running through to the roots. A coat of ten to twelve inches in this climate is sufficient for our common winters. The trench will prevent the water from getting into the heap. There is more danger of getting the covering too thick than too thin. I have suffered more from heat than frost. After the earth is all put on, it should be carefully clapped down with the spade, to make it more effectually shed the rains. After a few days I take a crowbar and thrust it in the top along the ridge down into the heap, no matter if it breaks some of the roots, and open holes about three feet apart, to let the gas or vapor off, which is generated by a partial fermentation. A flat stone, raised a little, on one edge set up an inch or two, or a wisp of straw may be put into the holes to prevent the rain from getting in, which completes the work for the winter.

With me the ruta baga is a valuable crop. They afford the greatest quantity of food for my stock, from an acre, while they seem to exhaust the land less and leave it in the best possible condition for a succeeding crop. It is too rich for oats, but well calculated for barley, and clover seed always "takes well," sown with it. I feed them to my cattle, sheep, hogs, (boiled,) and occasionally to my horses. For calves, the first winter, they are very valuable, keeping their bowels open and loose; they will grow and thrive without running too much to fat; their coats smooth and glossy, and continue to grow through the winter, and "go to grass" in fine condition, by which they gain at least six months in their growth over those wintered in the too common and ordinary way. Heifers wintered in the above manner will answer to come in at two years old. I have one now in my yard that will not be two years old until January next; she had a calf last March, and has been milked ever since, and I cannot perceive that her growth has been retarded in consequence, and she is now as large as common three year olds.

C. N. Bement.

Southern Planter.

ROOTS.

Three Hills Farm. Dec. 6, 1842.

Messrs. Editors.—From the very flattering manner in which you have introduced me to the readers of the "Southern Planter," I cannot resist the call to furnish you with a statement of the treatment, culture, and produce of my carrot patch and field of Swedes.

I am not so vain as to think I can furnish any thing new on the subject, to your readers; but a plain, practical, matter-of-fact account may not be uninteresting to them.

Although the root culture has been gaining favor, in this country, for several years, still, in my opinion, it has not received that attention it deserves. My soil is a loam, some parts inclining to sand and some to clay, and what is termed here, sandy-loam and clay-loam, and well adapted to the growth of roots, particularly carrots and ruta bagas. I have cultivated roots for my stock for the last ten years, and I have found no crop that pays better for the

expense of cultivation; none that abstracts less from the soil, or that leaves it in better condition for a succeeding crop. I have never failed in procuring a good crop of barley, and after ruta bagas, grass seed always *take well*. I have been less successful with oats, as the richness of the soil causes a too luxuriant growth of straw, whereby they lodge and do not fill so well.

You will recollect that my carrot patch was near my house; I call it my *accommodation* crop, from its being near by and can be worked at odd times; besides it is the scene of my labor! Do not start, gentlemen, for I assure you I do not belong to the silk-stocking gentry. If you had made your visit in the summer, you might possibly have found me in my "frock-and-trousers" in the very midst of them, and the perspiration profusely rolling off my face in drops as large as peas.

To ensure a good crop of carrots, and it will apply equally well to all crops, it is necessary to have the soil not only rich but well worked and pulverized. As soon as the soil is sufficiently dry in the spring, I plough as deep as possible, and after one or two weeks, I haul on at the rate of sixty cart loads, (equal to thirty wagon loads,) of compost manure, and spread evenly, and harrow it thoroughly, when the plough is again put on and a shallow furrow turned, just sufficient to cover and mix the manure with the soil. It is now suffered to rest until the seed is to be sown, which in this climate will be from the 10th to the 20th of May. Previous to sowing it is thoroughly harrowed, and then thrown into ridges, twenty-seven inches apart, which is done by turning two furrows together. A light roller is then passed over, flattening two ridges at every turn, the horse walking between them. This leaves a flat surface of about four inches wide for the drill, which follows and deposites the seed in the centre about half an inch deep; a small roller attached to the drill follows, covering and compressing the earth to the seed, which completes the operation.

As soon as the plants are about an inch high, they are weeded and thinned, which is considered the most tedious operation, which is rendered easy and expeditious by what we term the "push and pull" system. In the first place we run the cultivator, with the wings closed, between the rows, and then by standing in the furrow, with a small narrow hoe, say three inches wide, push one side of the plant and pull the other side into the furrows, which will leave the plants about four or five inches apart, which I conceive to be the proper distance. After the second working, which is merely running the cultivator between them again and cutting up the weeds, the ridges vanish and the soil becomes nearly level.

The advantages of cultivating on ridges, are, the soil is warmer and drier, the plants are more easily distinguished, the weeds do not grow as vigorously and are much more speedily removed. The great secret in making good root crops is in thorough cultivation and a generous supply of manure.

You will recollect the carrot I cultivate is the white Belgian variety, which I esteem the most profitable on account of the great produce and the ease with which they are harvested. Unlike any other variety, from three to four inches of the root rises above the soil, which affords greater facilities in drawing, which can be done by grasping them with the hand, resembling in that respect the mangel wurtzel.

I gathered them on the 14th of October, which was accomplished in the following manner. Each man took two rows, pulling and laying the tops all one way in a row. After they were all pulled, the tops were struck off at one blow with a knife made of a piece of an old scythe, and the roots of four rows were thrown into one; the cart followed and the roots were tossed into it with the hand. The crop obtained from the patch, which is about one-third of an acre, was 305 bushels.

It is impossible for me to estimate the expense of this crop, as the labor was done at odd times, in the morning before breakfast, when the main work was at a distance. In comparison with the ruta baga, I judge they cost about one-third more, which would bring them at about nine cents per bushel.

I agree with Mr. Botts in estimating their value. For horses and milch cows, I consider them superior to any other root. Horses become very fond of them, and fed once per day with them, their bowels are kept loose, and the hair becomes glossy, giving them a lively and healthy appearance. Cows eat them greedily and their milk is of the richest color, and the butter of superior quality. They are in such high estimation in this section, that a gentleman in the city paid me twenty-five cents per bushel for a load of them to feed his cow.

From the amount taken from the small piece, as above, I am well persuaded, that one thousand bushels, every thing favorable, can be grown on an acre.

My method of cultivating the ruta baga is similar in several respects to that of the carrot. They require a lighter soil and delight in a sandy loam, and will bear as much manure as any other crop, not even excepting corn. I have grown good crops on a sod, by turning under forty loads of fresh yard manure. I prefer, however, to have them succeed potatoes, which was the case with the field you saw in October last.

Last spring a compost of yard manure and the refuse of a glue factory, consisting of lime, bones, wool, hair and bits of pelt, was applied, say twenty loads to the acre, carefully spread after the first ploughing, and turned under with a shallow furrow and thoroughly harrowed, and mixed with the soil—then thrown into ridges twenty-seven inches apart, the tops flattened with the roller, and the seed deposited with the drill, &c. The after culture, with the exception of leaving the plants from nine to ten inches apart in the drills, was the same as that of the carrots.

There is one fact in regard to this crop which I never noticed until last summer. It so happened that a part of this field was not weeded and thinned for some days after the other, and the plants and weeds had attained consi-

ble height before they were worked, and caused about double the labor to finish them. On pulling we found them on this part of the field, less in size, necks long and tops large—termed "necky." On reflection, the same has happened before, and I could not account for it. I have also heard others complain of the quality of their seed, that the plants would not bottom, &c. I have seen some of these patches and recollect that they were very close and there was apparently a great strife between the plants and weeds for the ascendency.

I finished pulling my crop on the first of this month, and they amounted to 2,355 bushels, and as near as I can make it out, the expense of cultivation would not vary much from six cents per bushel. We think there was not far from three and a half acres. I feed them to my cattle, sheep and swine; and for feeding calves the first winter, they are invaluable, carrying them through in fine condition, and promoting their growth wonderfully.

In storing them I fear the heat more than the frost. I have about 1,600 bushels in a cool cellar and 600 in heaps covered with straw and earth, for feeding my ewes in May.

Southern Planter. C. N. BEMENT.

MANURES.

"MANY A MICKLE MAKE A MUCKLE."

Scrape up the droppings from your cows in your avenues and door-yards. Get together the rotten chips and bark from the wood yard. Collect the rich soil which accumulates in the holes and corners around the house, the barn, the hog-pen, and all out-buildings. If these materials are not wanted for immediate use, make them into a compost heap.

Have some expedient, also, for saving from the unfavorable action of rains and sun, what your cows drop in the barn-yard during the summer nights. Covering the bottom of the yard with loam or muck, will preserve the greater part of the liquid secretions; but the solids will lose much of their worth, if not daily covered with the soil or muck. Where the barn is airy and has a cellar under it, we recommend keeping the cows in the barn every night of the year. They suffer no discomfort, and we know of no other way in which so much and so good manure can be obtained from them.

Also, have materials at the side of the hog-yard constantly, so that something may be thrown in every two or three days for the swine to work upon. Throw in not *too* freely, however; there is a limit beyond which it is not profitable to fill up the yard. For it is not true, that every thing which finds its way within the four walls that confine the pigs, is immediately converted into good manure. We believe that two, or two and a half cords is as much as one hog will ordinarily manufacture *well* in the space of twelve months. By occasionally putting in lime, ashes or stable manure, the quantity may be rendered somewhat more than this. But while we caution farmers against reducing the quality *too much*, we earnestly call upon them to be careful to furnish the swine with *enough* of the raw material.

You have been so often told that *manure—manure—manure* is the one thing needful for successful farming, that it seems almost an insult to say it again—and yet it is so true and so important, that we do say it. We tell you to collect and save and make *manure—manure—manure.* We would write this word over the doors of your hog-pens, your barns, your privies; near your ash-holes, sink holes, and every other spot where the article can be manufactured. We would send you to the roadside, to the woods, to the sides of stone walls, to peat meadows and muck holes, for collecting matter to be converted into this essential article. We would send you *now*, as soon as the planting season is over, and would have you collect as much as possible. It were well to have years' supply always on hand in heaps. Thus placed, it would be constantly improving; and if thrown over once or twice in a year, the fermentations and decompositions it would undergo, would greatly enhance its fertilizing properties, even before it was handed over to the cattle and swine. Make manure; little by little, from day to day, will swell to a large pile in twelve months.—*N. E. Farmer.*

LIEBIG'S ANIMAL CHEMISTRY.

The ancients held that all bodies were composed of fire, air, earth, and water, which they called elements. The chemists of the present day enumerate fifty-five elements. Of these only a few enter into the composition of organic beings Into the texture of plants and animals minute portions of lime, iron, silex, soda, potash, sulphur, and phosphorus, enter; but it is carbon, nitrogen, oxygen and hydrogen, that constitute the main bulk of their solids and juices. These last are the alphabet, so to speak, out of which the beautiful volume of the living world has been composed. Widely as plants and animals differ in outward show from the atmosphere they breathe and the soil in which they are fixed and on which they tread, they present on analysis no element which is not found in the mineral kingdom. It may well excite surprise that the blood, mantling in the cheek of female beauty, and the brain which gives manifestation to the mind of the orator and poet—that the muscle of the herculean frame, the viper's venom, the food that nourishes, and the vegetable poisons that destroy, the nectar of flowers and the noisome exhalation of marshes, all, however varied in form or opposite in quality, consist of these four elements in endless combinations—all derive their shape and strange diversity of attributes from varying proportions of oxygen, carbon, nitrogen, and hydrogen.

Animals and vegetables agree, in deriving their existence from parents, in growing from small beginnings to a determinate size, and

then yielding up the living principle, and mouldering into the elements from which they grew, by which they are easily distinguished from the inorganic matter which constitutes the mineral world. Animals grow by imbibing oxygen and eliminating carbonic acid; vegetables, on the other hand, absorb carbonic acid, retain its carbon, and emit the oxygen. They both live in the atmosphere, which is equally indispensable to either race, but each derives support from matters given out from the other. They would alike perish in an atmosphere of carbonic acid, but while this gas is exhaled continually from the lungs and breathing pores of every animal, it is greedily drunk up by the green vegetable, and aids in its nourishment and growth.

Liebig has written with singular ability on the functions of both classes of vital beings. His admirable treatise on vegetable physiology and agriculture has been repeatedly noticed in our paper, and we propose now to give an outline of his theory of animal chemistry.

A few years ago, very little was known of the chemistry of organic beings. Analysis, it is true, had been effected of many animal and vegetable products; and isolated facts, the value of which was not appreciated, were scattered over the pages of writers on physiology and chemistry. A rude attempt was made at an early period in the history of these sciences to explain upon chemical laws some of the functions of animal beings, but these speculations, for the most part, were eminently and even ridiculously abortive. Where the early chemists hit upon the right track they were soon lured from it by the absurd philosophy of their times, and their best efforts were but slight approximations to the truth. But their labors multiplied the materials of the science, and out of the shapeless mass of observations which has been steadily increasing, the beautiful system of Liebig has emerged. Since the time of Dr. Black, some of the great minds of every period have been busy at work upon the foundations of animal chemistry, and the science has at last assumed a shape which promises to be enduring. The honor of rearing the edifice will generally be ascribed to Liebig, but this is not entirely just, for, on many points, the most that he can claim is the credit of having worked into a system facts which others had established, This, indeed, was a great work, requiring a genius of a high order; nor is it the only merit which belongs to this author. He has verified results, in numerous instances, by repeating experiments with the utmost care and precision; and he has added by his original researches many important facts to our stock of knowledge on several subjects connected with the functions of living beings. In his hands the materials have been classified and arranged, and have assumed the character of genuine systematic science. We have no hesitation in saying that he is one of the first philosophers of the age, and that the present, like his former work, will compare in logical clearness and original speculation with any that has been produced in modern times.

The power in animals of maintaining an equable temperature under great differences of exposure is one which has engaged the attention of physiologists since the earliest ages. A man, it has been proved by the most repeated observations, preserves the natural heat of his body whatever may be the temperature of the climate in which he lives. At Palermo, or Algiers, where Fahrenheit's thermometer, in the shade often rises to 100 degrees, the temperature of his blood does not grow warmer than his hyperborean brother, who is exposed to an atmosphere that frequently sinks the thermometer many degrees below zero. What makes the case still stronger, men have often been shut up for a short time in a room, the air of which was heated far above the boiling point of water—to a temperature high enough to broil a beef-steak and boil vegetables, without suffering any decided rise of their own temperature. These are curious facts, illustrating forcibly the independent temperature of animals; and this remarkable function is one of the problems to the solution of which Liebig has devoted a considerable portion of his work. With Dr. Black, Lavoisier, Crawford, and others, he regards respiration as a process of combustion, and as we warm our apartments by burning coal and wood, so we keep up the warmth of our bodies by burning portions of our food, which we take in as fuel. The animal body, according to this doctrine, resembles a furnace—the food corresponding to the fuel, and the oxygen of the atmosphere serving, as it does in the furnace, to consume the fuel and evolve heat in the process. Lavoisier has shown that a man, of ordinary size, and in perfect health, consumes more than seven hundred pounds of oxygen, in the course of the year, without gaining in weight. The man, during this time, has been taking food every day, and Liebig proves very clearly that a large portion of it must have united with the oxygen to form the carbonic acid, fifty thousand cubic inches of which are daily exhaled from the lungs of an adult. Now the conversion of carbon into carbonic acid is essentially a heating operation. It never takes place without the extrication of heat. The union is rapid in our fire-places, and the quantity of caloric emitted in a given time is very great; but the amount of heat generated by the combnstion of a specific quantity of carbon is a fixed quantity. It is evolved slowly from the mass of fermenting vegetable matter, from the malting grain, for example, and from the heap of half-cured hay, but the number of degrees of heat thus given out is not less, for the quantity of carbonic acid formed, than if the combination had been the work of a few moments.

A man in good health, and taking moderate exercise, consumes, according to our author, nearly fourteen ounces of carbon daily, which escapes in due time, as carbonic acid, through the lungs and skin. For the conversion of so much carbon into the acid, thirty-seven ounces of oxygen are necessary, and in this union, which takes place in the body, every four-and-twenty hours, 195,531 degrees of heat must be liberated—an amount sufficient to cause 68 pounds of water at 32 degrees to boil; or to heat 184 pounds to the temperature of the hu-

man body. If to this, the heat evolved by the hydrogen of the food, during its conversion into water by oxidation within the body, be added, we shall find the quantity amply sufficient to explain the uniform temperature of the human body.

But, in order to maintain this constant temperature, the supply of food and of oxygen must vary with the changes of atmospherical heat and cold to which the individual is subjected. He must take more food in cold climates than in hot, and more in winter than in summer, and his food must also be of a richer quality. And this is the case with the inhabitants of high northern latitudes. The Russian, amid the snows of the arctic circle, devours the raw flesh of the deer, and drinks its warm blood as it flows from the body; and the Esquimaux will eat ten pounds of flesh and perhaps a dozen tallow candles into the bargain, daily, without the slightest fear of indigestion. The people, on the contrary, who inhabit a climate but little below the temperature of their bodies, subsist chiefly upon fruits which contain a small proportion of carbon. At the North, such fruits could not be matured, nor would they be suited to the wants of the inhabitants. It is animal food, and that of the fattest quality, that they need to supply their systems with the requisite amount of fuel. Children, for the reason that respiration in them is more active than in adults, require to be fed oftener; and birds, having large lungs in proportion to their bodies, die of hunger in as many days as it takes months to starve serpents which breathe slowly and consume little oxygen. The animal heat of the two tribes of creatures is correspondent. That of birds is higher than the temperature of man; that of the reptile is but two or three degrees above the temperature of the surrounding atmosphere.

The food of animals, therefore, performs a two-fold office—it contributes to the nourishment of their bodies, and it furnishes the fuel by which animal heat is developed. This is one of the most striking and original of Liebig's doctrines, according to which the aliment of animals consists of two classes of substances, destined to perform altogether different purposes in their economy. The first he calls the *nitrogenized* elements of food, or *the plastic elements of nutrition*, which go to make blood, and execute the various offices of growth and reproduction; and the second *non-nitrogenized* elements, which do not contribute to the nourishment of the body, but are consumed in the production of animal heat. Milk, which is the food of the young animal of so many species, contains both elements. The caseine, or cheese, is the portion which nourishes; it contains the materials for making blood, for the formation of bone, and the other functions of its immature system, whilst the sugar of milk, and the butter supply it with fuel. In wheat, and other grains of this class, as also in the potato, though not to an equal extent, the same admirable combination exists, and these are the chief articles of food for man and for his domestic animals, in nearly all the temperate regions of the globe. The nutritious principle is contained in the gluten; the fuel, in the starch, the oil, and the sugar. In proportion to the cold to which the animal is exposed, is the consumption of oxygen and of fuel; and as the same is true of exercise, it follows that men and animals who are compelled to labor must be better fed, and that even with an ample allowance of food, if their labor is severe, they do not grow fat. The starch, sugar, and other elements which would be converted into fat, are entirely consumed by the process of respiration. If, with the same allowance of food, these individuals are permitted to take less exercise, the fuel is but partially consumed, and a deposite of fatty matter is the consequence. This is shown constantly in the hog and in the whale, animals which eat largely in proportion to the oxygen consumed—in other words, to the exercise they take—and which consequently grow exceedingly fat. It is seen in the bear also, and in the opossum, in which the fat would seem to perform the double office of protecting them against the external cold, and of supplying the internal heat necessary to maintain life during the frosts of winter. And the opposite phenomena are observed in the deer, and animals that like it are active in their habits, the flesh of which is always comparatively lean. The oxygen they consume is sufficient to convert into carbonic acid all the carbon of their food, the excess of which would go to the production of fat. To agriculturists these facts have long been familiar, and it is the well known practice with them to confine cattle to small comfortable stalls, and hogs in narrow pens, where the object is to fatten them in the shortest time and with the least expense of food. But we have not space to pursue the subject further at present.—*Louisville Journal.*

THE PEACH TREE.

The suggestions below as to the use of lime around fruit trees, are worthy of attention. In the autumn of 1841, we laid bare the roots of a number of unthrifty apple and pear trees, and left them exposed during the winter, returned the dirt in the spring, and applied to the roots of each tree about half a bushel of gas lime. Last year the trees seemed greatly improved, and the pears bore more than three times as much as they did the two previous years; the limbs had to be propped up, and the fruit seemed improved. We treated some old quince trees in a similar manner, and the influence was obviously beneficial. Ashes are a good substitute for lime, and ordinary lime would probably do as well as the gas lime. Exposing the roots of trees occasionally during the winter, it is well known, is very beneficial.

November 22, 1842.

I have perfect faith in the beneficial use of calcareous substances applied to the roots of trees, sensible, as one of your correspondents has observed, that "oxygen is the basis of acidity," with which all putrid substances are charged: and it is with this view that Major Reybold

of Delaware, that first of cultivators of the peach, for he and his sons, and sons-in-law now number 78,000 peach trees planted in orchards, is at this time actively engaged in dressing his trees with shell-marl; by depositing a quantity at the root of every tree, to be pulverized by the frosts the ensuing winter. He also cultivates his orchards with the plough; turning a shallow furrow over the whole surface of the land, three times during the summer, a weighty affair, seeing that one of these orchards contains more than 100 acres; by these means he conceives that he renovates the land and benefits the health of the trees, which are indeed in full vigor, although many of them are very old, and the size of some apple trees of mature growth. I remember also that Mr. Dager, one of the proprietors of the lime quarry, mentioned at page 309 of the 4th volume of the Cabinet, the lime from which was proved by analysis to yield 96.6 per cent. of carbonate and not a trace of magnesia, increased the size of the fruit of an apricot tree three fold, by digging in around its roots a quantity of lime; adding also to its flavor in an equal degree. A. T. B.

—*Dollar Farmer.*

APPLICATION OF MANURES.

Allentown, Dec 20th 1842.

Messrs. Editors.—It is really surprising to see the attention that is beginning to be paid to the subject of manuring; and if to this principle could be added, the *more important* one of pulverization, and the necessity of a change of crops be understood and acted upon, our labors would be one half lessened, and our crops be one half increased, with the greatest ease and comfort to ourselves. In reading a late treatise on agriculture, I have been highly interested and instructed by the following observations, and conceive they would be found of great importance to your readers, if you would afford space in your publication for their insertion. The author observes:

"The application of the same kind of manure to plants or trees that occupy the soil for more than one year, is not always advantageous, nor does the land prove so productive, as might often be expected, from the labor and pains bestowed. The advantage of variety, is, greater fermentation—consequently, greater benefit from the air and rains; for the same manure operates on the soil, especially if it be not aided by cultivation, like the same medicine, or the same food or air on the body, which are found to loose their best effect after too long repetition. This is not exactly the case with arable land, because of the variety of crops and of careful *cultivation*, which is the most powerful means of all, as it admits of the application of the same manure for ever, with the same success. But it is proper to observe, an *excess* of manure, particularly when put on in a raw state for the coming crop, is as injurious, as when the land is permitted to become poor from the want of it; for of *fertility*, there may be named three descriptions; as first, *extravagant* fertility; second, *productive* fertility; third, *apoplectic* fertility. The first is, when so early and rapid a decomposition takes place, that the plants thrive too fast in their youth, and then, towards harvest, they have nearly or quite ceased to grow, without perfecting their seeds: this is commonly called winter or spring *proud*, and summer *poor*. On examining the stalks and leaves, they will be found to be covered with rust or fungi. The healthy secretions are at an end, and fermentation of the juices succeeding, a gas is formed which bursts the vessels of the plant, and fungi make their appearance. The cause of this *extravagant* fertility is this—the grain was sown on fresh or recently manured land, and the result is, the crop receives its food directly from the manure in the first instance, and of course, in an unselected, undiluted state, instead of disengaging it from the *soil*, with which the particles of the manure had been lightly combined by previous cultivation; for the fresh manure decays faster, and forces itself upon the plants beyond what they naturally and immediately require, and being aided in its decomposition by the vegetative powers of the grain, a too rapid growth is at first brought on; and then, as the plants have been induced to commence their structure upon a large scale, by the abundance of the materials afforded them, they require a proportioned greater quantity of the same materials to maintain and complete what they had begun; but from the two-fold cause of an early extravagance and large structure, they find those materials deficient at the very time when wanted the most—at the formation and completion of the seed: the *soil*, all the time, from its poverty—not having the manure properly mixed and distributed by cultivation and oft-repeated stirring, effects but little towards the growth of the plants. Therefore, out of the two sources of fertility, namely, manure and cultivation, the one most important, namely, cultivation, having been neglected, fails of its supply, and disease of the plant necessarily follows.

"The cause of the second, or *productive fertility*, is owing to a regular decomposition going on, within the reach of the roots of the growing plants, when food is yielded sufficiently fast to meet all their necessary demands, and continues thus from the beginning to the end; when a well matured crop is formed, with bright straw, a handsome plump sample, and in quantity proportioned to the native fertility of the soil: this favorable result being attributable to the crop being able to disengage its food from the particles of the soil, with which it had been combined by previous good cultivation and exposure—a fallow process. The beneficial consequence of this is, the plants have to exert their own decomposing and selecting energies to obtain the food they require, and therefore, *take up no more than what their healthy vegetation demands;* instead, as in the former case, of having their vegetation impelled on, as it were, by the too rapid and overwhelming self-decomposition of the manure.

"The cause of the third, or *apoplectic fer-*

tility, is owing to a too rapid decomposition taking place throughout the growth of the plants, as is the case with the grain growing on a dung-hill; they are seen to flourish away with uncommon vigor, as if in a state of intoxication, producing foliage by wholesale; and if standing in masses, are soon beat down by the wind and rain; when, the straw becoming broken, the sap is then impeded in its flow through the vessels, which are already overcharged with half-concocted food, forced into circulation by the too rapid decay of the manure beneath; the consequence is, the bursting of the vessels; and if the grain ever ripens, a lean, half-formed clevel is the only prodnct.

"To show the value of perfect tillage; a field of good land was manured and sown with wheat; its appearance during winter, spring and summer, was very fine; but when reaped at harvest, the straw was soft and the grain of little value. The owner of the field was persuaded to fallow the land, although he conceived it was sufficiently fertile, and not requiring such tillage; however, he had recourse to the fallow, and then sowed wheat again; the produce amply repaid the expense, for the crop yielded more than 48 bushels per acre—a proof of the superiority of cultivation, over a coat of manure without it. The process had mixed and combined the manure with the soil, and had restored its chemical powers; and therefore the succeeding crop drew from its resources, *now rendered healthy*, in exact proportion as it required the food."

The foregoing observations are invaluable—they are so plain that the man who runs, may read; and they must carry conviction to the breast of every one who is not blinded by prejudice. I have now before me the result a single extra ploughing and working, in a double crop of the finest turnips. I had well dunged a field for sugar beets, which I planted after once ploughing, calculating that I could loosen the earth by means of the cultivator, in the after working of the crop; but I found the plants so poor, that I determined to plough them up; well harrow and pulverize the land, and sow it with white turnips. This I did, and have never before gathered a crop at all comparable to it for quantity and quality; the bulbs are certainly heavier and closer than any that I ever grew before; and I now perceive the rationality of attributing the superiority of the turnip in England, to the very careful cultivation bestowed upon it; the land being ploughed five times, and repeatedly harrowed and rolled, by which it is completely pulverized; and the weeds are encouraged to grow, to be turned under by the plough; thus ridding the land of five crops of weeds before sowing the turnip crop. But, "can this ever pay?" I am confident that it can, and will.

JACOB HEINZEL.

—*Farmers' Cabinet.*

SOAP SUDS.

There is no better manure than dirty soap suds; and there is not a farm house in the country, but what produces enough of it in the course of a year, to manure a garden, two or three times over. Dirty suds, after washing, is almost universally thrown into the nearest gutter to be washed away and wasted. Would it not be an improvement, and show a laudable economy in the good woman of the farm house, to have it conveyed to the garden to enrich the ground, and make the vegetables grow more luxuriantly! The pot-ash, the grease, and the dirt, all of which are component parts of soap suds, are first rate manures, and should always be applied to make plants grow, and especially when hard times are loudly complained of, and sound economy is the order of the day. C.

Farmers' Cabinet.

SUBSOIL PLOUGHING.

Subsoil ploughing, which has attracted the attention of farmers for a few years past, and has been attended with successful results, it seems was put in practice in Maryland, in 1822, as will appear by the following extract from the American Farmer, of April, 1823.

"This is to certify, that in breaking my land for corn last spring, (about 60 acres,) I followed the barshare plough, with a substratum subsoil plough, until I had broke about 25 acres. I believe the average depth of my ploughing with the barshare was about five inches. That the substratum plough worked about seven inches deeper, in the same furrow; making the whole 12 inches deep. That otherwise, in the planting and tillage, the management was just the same, and the land of about equal quality throughout the field. That the corn on that part, where the substratum plough was used, grew about twelve inches taller, kept its color through the season, and produced at least 50 per cent. more corn. That the corn on the other part of the field, suffered very much with the drought, and fired considerably.

"JOSEPH DELAPLAINE.

"*Montgomery county, Md., Feb. 18th*, 1823."

It is hoped the above successful experiment, together with similar results within the last year or two, in other situations, will induce more farmers to try their hands at subsoil ploughing the coming spring. The trials, so far as they have been heard from, confirm the good results that were anticipated from stirring the subsoil, without bringing it to the surface, as is the case in trench ploughing. The subsoil plough introduced by Prouty, is a very perfect agricultural implement, and fully answers the purpose for which it was constructed. He has them manufactured, adapted to one, two or three horses, to suit circumstances. They would be a valuable thing to rouse up a garden with. They are nothing more than a plough without a mould board, rather narrower and higher than a common plough, and can be made by any common plough maker.

Quere—would not subsoiling be capital in potato ground? X.

—*Farmers' Cabinet.*

EDITORIAL CORRESPONDENCE.

[We frequently receive letters containing valuable information; and so far as we may be authorized to use them, we intend from time to time to make extracts for the benefit of our readers. The first of the following series is from an English gentleman, who has been residing several years in this country.]

Improvement of clay soils. Paring and burning bone-dust.

New Haven, Con., February, 1843.

From the limited opportunity I have had of forming an opinion of your soil and its culture, in merely travelling through different sections of the state, and from hints in one or two papers in the Register, I am led to the conclusion that your strong clay lands require *ashing*; and from early experience of the efficacy of ashes in ameliorating the condition of worn out soils, caused by injudicious cropping, that if a plentiful supply could be procured, your farmers of barren clay soils would soon rejoice in their possession, as when such lands are effectually recovered to fruitfulness, their capabilities are exceeded by none. I well remember the first piece of worn out clay operated upon by my father. It was covered with moss and poverty grass; but, after his renovating experiment, it became productive in the extreme, and required little or no manure for many years. His method was, to prepare a wheel plough with a broad sharp share, and the coulter set with its point nearly on a line with the point of the share, so as to cut a clean, broad and thin furrow, which was immediately cut into pieces of about two feet in length, and set up by boys in curves to dry. On becoming dry, fires were made in every thirty or forty yards square, and the turf added as required, never allowing the heaps to blaze, but kept close like a charcoal pile, as on this depends the excellence of the ashes. So soon as the whole turf is consumed, the ashes are spread evenly on the land, and immediately ploughed in, and a crop of oats or buckwheat taken, followed by wheat, and laid down with grass seeds sown on the wheat in the spring, giving a light harrowing, which will not injure the wheat, but rather improve it; and in some cases, when the lands are rough, I should recommend the roller a day or two after the harrow. This will smooth the surface, and make the seeds vegetate more freely. On your light soils I am fully justified in giving my unqualified approval to the use of bones in moderate quantities, say from 25 to 30 bushels of half-inch to the acre, first fermenting them with about 10 per cent. of unleached ashes, mixing the bones and ashes in a heap, and slightly sprinkled with water. In early life I once paid dear for over peppering my pie with this valuable manure; and as you may present the beacon to prevent others from stranding on the same shoal, I will give you particulars. I had imported several cargoes of bones from Germany [into England] in the way of merchandise, and becoming plentiful in the market, the crushers required all the small and dust to be screened out, which amounted to several tons. These I had sent home for my own use; and directed them to be spread on my vegetable ground and grass. Supposing not much virtue to exist in these screenings, my man used them with a liberal hand, as common yard manure. The consequence was that the greater portion of my crops were so monstrously overgrown that they were perfectly worthless. Cabbage, cauliflowers, brocoli, &c., all leaves and stalks; and part of my garden had to be trenched, not to enrich it, but to subdue its exuberance. As you no doubt have received a copy of our Farmers' Gazette, I need not enlarge on this subject, my views being partly before the public.

THOMAS WHARTON.

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Destruction of wild onions.—Rotten fish. Gypsum, &c.

Richmond, 23d February, 1843.

With your permission I will notice one or two articles in the Register. At page 24 I find a piece headed "destruction of wild onions," by W. H. Harrison, and a note on the same subject by "E. R., Jr." I presume Mr. H. will not succeed in destroying them by his proposed plan, nor by the one suggested by "E. R., Jr." Cultivation will not kill them. I would respectfully recommend to Mr. H. the following plan, which succeeded well with me. After he has taken off his crop of wheat this summer, let the land remain fallow until about the 1st of November; by that time the onions will be all up. Then with a plough that turns very flat, plough the land infested with onions, not too deep; let it pass just deep enough to turn the onion roots up to the surface. Allow the land to remain in this situation during the winter, and he will find, to his satisfaction, the work of destruction nearly complete, especially if it should be a severe winter.

I would next notice that part of "Dr. W. J. Dupuy's" communication at page 20, about his 17 barrels shad. I take it for granted the shad had been previously salted; and by placing them all in one common heap, and covering them thick with marl, they were thus excluded from the air and rain, and, although offensive to the smell, there must have been a sufficient quantity of salt to prevent their speedy decay.

Instead of throwing them all into one common heap, if Dr. D. had made them into a large compost heap, placing alternate layers of fish and clay, with a dressing of ground gypsum to each layer of fish, to retain the ammonia more effectually, in the mean time making the whole mass wet with water, he would have succeeded, I think, much better.

He seems to have fallen into an error in regard to the use of marl on such heaps. He says, "that the marl has the faculty to arrest and fix, as it were, for useful fertilizing purposes, that portion of the decaying matter which would evaporate, and otherwise escape,

I do not doubt." When animal or vegetable putrefaction takes place, carbonate of ammonia is formed, and is liable to escape, being very volatile; but this never can be prevented by the use of marl; lime and ammonia having no affinities for each other whatever. The sulphate of ammonia, which has no volatility, except at very high temperatures, if brought into contact with quick-lime, will be instantly liberated and driven off. Sulphate of lime, plaster, should invariably be used about such decaying heaps. Plaster contains 44 per cent. of pure sulphuric acid; and we have the authority of Prof. Liebig for saying, that when carbonate of ammonia and plaster are brought together at common temperatures, a mutual decomposition takes place; the sulphuric acid combines with the ammonia, and the carbonic acid with the lime, forming two compounds, carbonate of lime and sulphate of ammonia. The sulphate of ammonia having no volatility, is retained in the mass; hence the use of plaster is most clearly indicated.

GEORGE WOODFIN.

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Breeding saddle horses.

* * * * My horse, you will perceive, is something of the *useful* kind—a *rara avis* of his species in Virginia, where hitherto the racer alone has been reared and esteemed. That innate love of horses, common to most Virginians, first led me to think of rearing that noble animal; but, never having indulged a taste for the sports of the turf, my system of breeding took a more utilitarian turn. I was fortunate enough too to possess some very fine mares of the Roe Buck stock (a race of horses well known in this part of the state;) besides a northern mare and trotter of English hunters' descent—full 16½ hands high, and, without exception, the finest traveller I ever saw. To them I have since added other very fine mares by purchase and breeding. My plan has been, by judicious crosses upon these mares, of the largest and best of the thorough bred horses of the state, and then recrossed, &c., to propagate a distinct race of roadsters and hunters. I have at present some twenty or more mares, colts and stallions, from which I am breeding upon the above plan, and shall continue the system for my gratification, which will be enhanced by the consideration that it may one day prove of some public use.

PHILIP ST. GEO. COCKE.

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Peach trees.—Grub.—Lady bug.

Flora Point, Feb. 15th, 1843.

I have no doubt you will find the coulter a sure remedy for the peach worm. An experienced neighbor of mine says that a cedar limb two or three feet long, placed near the root of the tree, will effectually prevent the worm. If so, it is much more easily done, and less expense. I intend to try it. The lady bug made sad havoc among our peach trees last summer; but I hope we are prepared for them, should they return this spring. We intend to whitewash the body and large limbs early in the spring. A friend of mine, who has tried this remedy, says the bug will leave the tree after its being whitewashed. This, I think, is highly probable. This bug may be found early in the morning on the sunny side of the body and larger limbs; but if they should deposite their eggs, (which is always done on the tender twigs and leaves,) we intend to give them a shower of soap suds. The soap used for this purpose differs from common soft soap only in the grease used in making it, which is whale oil instead of the ordinary soap grease. A gentleman of my acquaintance described an instrument he had seen in use at the north for gathering peaches, which to me is a novel, and, I think, a useful one, particularly to persons who cultivate the peach for market. All who have attended to the gathering of peaches, plums or apricots, must have experienced inconvenience in picking the ripe fruit from the top of the tree; this instrument, it seems to me, will make it quite easy. It is made in this way: take a staff of a convenient length, proportioned of course to the height of the trees, attach a small bag to one end, with a circular rim to keep the mouth of the bag open. When finished is not much unlike a fish net. The ripe fruit being selected by the eye, is lightly touched with the rim of the instrument, and the fruit falls in the bag. J. S. WISE.

ACTION OF ALKALIES ON SOILS.

Potash renders most of the vegetable humus soluble in water; consequently it produces a very marked and powerful effect, rendering vegetation for a while extremely luxuriant, but the evils that follow from a too free use of this substance, are very great, for the soil is in a few years deprived of its vegetable matter, and is rendered barren. Hence it is absolutely necessary, if you make a free use of ashes in the amendment of soils, that a constant supply of vegetable matter should be introduced into it, to furnish an unfailing supply of nutriment to the plants. Negligence of this principle will surely convert the farm dressed in this manner into a barren waste, and every farmer ought to be well informed on this point. By knowing and attending to the rule here laid down, the agriculturist may avoid those difficulties which I find are so prevalent in Maine and New Hampshire, where ashes is used in the treatment of soils. On the sandy soils of Long Island, New York, the farmers know that they must put in a large quantity of compost with their ashes, and sea and rock weeds are the most accessible sources of vegetable manure which they have at command. Spent ashes acts also by the quantity of lime it contains, and the principal advantage of using it in preference to lime alone, in the treatment of sandy soils, it depends upon the clayey nature of the ashes itself, which serves to improve the texture of the soil, and retains the manures and water longer than it otherwise would.

—*Dr. Jackson.*

ON SURFACE MANURING, &c.

Cambridge, E. S. Maryland, Feb. 22, 1843.

TO THE EDITOR OF THE FARMERS' REGISTER:

In compliance with your request, to write you a paper, occasionally, on agricultural subjects, I have selected for the present, the much controverted, and deeply interesting problems of "surface manuring," "winter furrowing" and "drill planting:"

This selection has been made, not in the vain hope of settling these important points, so warmly mooted; but to offer the testimony of my experience. corroborated, I think, by unquestionable principles.

As to the first, "surface manuring," I enter against it my deliberate protest; and though I am aware of the able authorities in favor of the practice, yet I must express honestly, and unpretendingly, my thorough conviction of the error of this mode of applying manures, and of the extensive waste that must attend the general practice.

By this mode of application, it is, I think, demonstrably true, that the most essential constituents of the organic manures are lost, or much diminished in quantity; I allude to the gaseous products; from which is derived the chief, and most precarious supply of nutrition, afforded by them, in the process of decomposition to vegetable growth and maturity. The salts and fixed alkalies, though useful, indeed essential, are easily furnished, and without danger of waste.

Among the gaseous products, the most prominent in its physiological agency, is the nitrogen; without this, the most valuable parts of plants, and especially the grain, cannot be matured, as Prof. Liebig has remarked, without "nitrogen," an herb will be formed, but no grain: even sugar and starch may be produced, but no gluten. Hence it is, that this gas is essential to the attainment of our agricultural views, in general, an indispensable element of the most valuable plants, and parts of plants, grown for animal sustenance.

The inquiry then arises, in what manner can we, most abundantly, obtain, preserve, and appropriate this invaluable, but volatile substance?

The great source of this elementary material, within the reach of the agriculturist, offers him a supply, in two modes, for practical purposes; the one, as the direct product of all organic bodies in progress of dissolution; and manifesting itself, in the form of ammonia, by its combination with hydrogen, another useful element, and highly elastic, and so is the compound. The other, the indirect supply, from the atmosphere, at large, where it is accumulating daily, in the same form, and from the same fountain, and the more copiously, by the wasteful exposure of putrescent materials on the surface of the earth, with which it can but partially unite, to the evaporating agency of wind and sun.

These are the conditions under which this all essential, but precarious substance is presented to us: its *generation*, *utility*, and *volatility* will not be denied; and being assumed, the question arises, how shall we most effectually and economically preserve and appropriate this subtle and valuable substance to the vegetable purposes, for which it is so earnestly desired?

To undertake a regular demonstration, that to preserve and appropriate this volatile gas, and to prevent its dissipation, by the constantly present agency of wind and weather, and in its nascent state too, when issuing from the generating mass; to name even the obvious mode to be by covering and mixing it with the earth, and thereby protecting it from these influences, would seem to be superfluous; but, as some able and confident advocates for the practice of surface manuring, are to be found in the agricultural ranks, the subject demands consideration.

In the Farmers' Register, vol. x, p. 37, a very intelligent writer, and advocate for the practice, says, "that every chemist will tell you, the gases are so subtle, and elastic, that it is almost impossible to confine them," and he adds, "this being the case, can any suppose they can be confined by a covering of loose, porous earth?" He continues "No! the chemist can scarcely confine them in his *retorts*." The paper quoted is anonymous, but the author bespeaks much talent and information, and perfect confidence in his conclusion, chiefly drawn from the *unconfineable* character of the gases. He has probably fallen into this error, from a hasty judgment, upon a partial view of the principles involved: his attention has not been attracted to the discrimination in the case presented between the *mechanical* and *chemical* forces.

The difficulty suggested by him, of confining those subtle substances, by the chemist, in his *retorts*, is freely admitted: yet, the chemist may readily *confine* them even in the open air, by *chemical forces*. Ammonia, for instance, carbonate or caustic, may be arrested in its escape, and firmly fixed by an acid; and as Liebig, in his admirable work on Organic Chemistry asserts, "the oxides of iron and alumina (clay) form solid compounds with ammonia;" in fact, numerous bases are known, such too, as are usually present in the soil, or may be easily applied to it, which are capable of arresting the flight of ammonia, without the aid of a *retort*, and by simply mixing them with this substance; yet, a *momentary* presentation of their respective *surfaces* in contact, would exert but a very partial influence in securing the chemical union, and thereby, in preventing its atmospheric dissipation; as chemical science will infallibly manifest, in practice as well as theory.

Water, too, has a strong affinity for ammoniacal gas. Sir H. Davy, in his Elements, says "that water, at common temperature, will absorb more than six hundred times its volume of ammoniacal gas;" and Dr. Henry asserts more than seven hundred times. Hence, it is a ready and omnipresent medium, by which this volatile substance, directly emanating from the decomposing bodies may be confined, and that floating in atmospheric space, and partially returning with the water from the clouds, in which it had been dissolved on its escape from the hard *surface* system

may be measurably detained, by the loose earth covering the manure, if turned down; and the soil, replenished from the two sources united, fixed, and preserved, in the most abundant and economical manner, get the whole of the nascent nitrogen, in the form of ammonia, directly from the materials, in their recent and present progress of putrefaction; and a part of the general atmospheric waste recovered; which is more considerable than usually supposed.

Thus, then, this subtle and essential element of nutrition, as well as other useful and volatile substances, are *confined*—fixed and preserved, for future use, when the analytic hand of nature, by the vital instruments of the growing plants, will be enabled to appropriate them, on demand, to their necessary purposes of vegetable aliment, and the final gratification and profit of the culturist. In fact, the article will be in place, when called for.

On the contrary, expose this volatile substance on the hard surface, uncovered and unmixed, and in its free, uncombined state, to the exhalent agency of wind and weather, when wanted it will not be found, but will have escaped to the atmospheric regions above, and beyond the reach of the chemical affinities, or of the powerful instruments of the vital organism, and its recovery will be, at most, partial and precarious.

In regard to other gaseous products of putrefaction, the same remarks are generally applicable in different degrees:—the carbonic acid, which furnishes the largest portion of the animal, as well as the vegetable structure, is also very soluble in water, and so is the oxygen; they are subject to the same laws, and may be fixed in the same manner, for all practical purposes.

In the 2d volume, p. 642-3, of the Farmers' Register, I this moment discover a paper under the signature of J. M. G., advocating the partial practice of surface manuring; and, in a subsequent paragraph of the same paper, indicating a strong inclination to the practice in general. The writer displays much ability and ingenuity, and much confidence—itself a proof of his sincerity; but I must respectfully take exception to his theory. Substantially it runs thus:—"Providence has given to the *earth* a power, a kind of chemical affinity, or elective attraction, by which she draws to herself (contiguous) substances, which may be most fit, or useful, for the *functions* of the *roots;* and to the atmosphere a similar capacity to impart to the *leaves* what *they* may, on their part, administer, or prepare, for the nourishment of the plant; and that the *earth*, having the *greatest agency* in vegetation, must have a *stronger* elective attraction for vegetable nutriment, than the *atmosphere;* and, moreover, that the one power, operating *below*, and the other *above* the ground, nothing can be taken from the one to the other, and that of course there can be no danger of spreading manures on the surface."

He suggests, further, that the *earth* and the *atmosphere*, by their own peculiar elective attractions, will and must divide between them all the food of plants contained in manures, whether such manures be above, or below ground; and that, therefore, interposition by man, may only injuriously retard, but cannot prevent it.

The remarks which I have already offered will apply to this theory, and need not be repeated; but I will add, it is truly difficult to imagine that so large a portion of the gaseous matters can be possibly imbibed by simple momentary contact, on the hard surface, as would be by mixing them with the loose earth. It is manifest, their extreme levity would soon, and infallibly, place them out of the reach of these elective powers, inferred from the greater agency of the *earth* than the *atmosphere*, on which the author seems much to rely, and scatter them through the air abroad to the skies.

J. M. G. contends also, "that, as it (surface manuring) is *nature's method*, we must believe it the *best*." And he adds, "where is the necessity of supposing any thing lost in the process, since it is quite irrational, as well as unscientific, to imagine her (nature) capable of wasting any of her precious gifts to man?"

Again he says, "In *nature's method* of restoring exhausted fertility, there is no heaping, or piling, or turning," (of manures.)

Again, confidently continuing his *reliance* rule, and assuming it as the best and admitted, he asks, "now, if the admirable rule, '*follow nature*,' is to be any guide for us, in improving our lands by manures, how is it to be done? Is it," he continues, "by applying them to the surface, or burying them below it?" "The answer to these questions," he adds, "if *candidly* given, would end the controversy for ever."

I can perceive no motive in the case for suppressing candor, as all have, I presume, the same end in view—the best method; and I admit, if the method of nature is the *best*, and her method be *surface* manuring, then the question is settled for ever.

But, from the strictness of this rule, "to follow nature," I must, with due respect, enter my dissent.

To oppose the laws of nature—to thwart her views, indicated for the general good of her creation—would, I freely acknowledge, be consummate folly; but to accept her useful and frequent suggestions, though obscurely and imperfectly offered, as if to *whet* the *energies of man*, and often containing principles not fully appreciable, without much labor and reflection, yet, in the final attainment, amply repaying him for his diligent research—to *improve her rough sketch*—to take her great design, and perfect it—this I hold to be sound philosophy.

In the example before us, for instance, nature scatters her seeds upon the hard, almost impenetrable surface, and her dead leaves and other crude materials with them; perhaps one seed in a thousand may vegetate, and produce a starveling, sickly plant, yielding a very few seeds, and unsavory fruits, fit only to continue the species, and prevent extinction; that man may ultimately perfect her work of imperfect execution, and, by his labor, experience and skill, multiply and improve the seeds, and ame-

liorate the fruits for the luxuries, as well as the necessaries of life.

Had nature, here, been strictly followed, in her primeval method of seeding and manuring, the number of animals, including man, now on earth, and subsisting on grain, fruits and herbs, would not probably have food for a day, or, which is the same, such animals would not have attained to their present numbers, by a difference incalculable.

The *normal* growth of plants has, by wide deviations from the methods of nature, been so improved in *size*, *quantity* and *quality*, as to be scarcely recognized, as the same species. As an eminent physiologist has remarked, "the special object of agriculture is to improve the *methods* and *results* of *nature*, and to obtain an *abnormal* developement (*i. e.*, one not conformable to her rules) of certain parts of plants most useful."

It is notorious, that by the force of *art*, founded upon reason and experience, as contradistinguished from the method of nature, many poisonous plants have been wrested from the hands of nature, and converted into wholesome and luxurious food. The potato, a wild weed of South America, bearing small tubers, too bitter for use, now ranks among our choicest vegetables, by an exchange of the *method* of *nature*, for that of the *invention* of *man*. By the same means the acrid, poisonous "apium graviolens," has become delicious "celery." Indeed results are without limit, to repudiate the idea of adhering to the methods of nature. It is true, her impressions of *instinct* are infallible, spontaneous, and independent of *reason;* but to *man*, with the exception only of what is *intimately associated* with his *animal organism*, she has tendered her favors—subject to the exercise of his *reason*, *deliberation* and *experience*. As Pope has prettily said,

"In reason raise o'er *instinct*, as you can,
In *this* 'tis GOD directs; in *that* 'tis *man*."

It seems clear, then, by common consent, that the "*method of nature*" is not, *necessarily*, the *best*; and that it has been often, and may be again, much amended; and that this didactic rule, "to follow the method of nature," adopted, and so much relied upon, in the case before us, by J. M. G., and which, with much respect, I must say, I think he has expressed and repeated with more emphasis than it merits, in his most excellent and ingenious essay, would, under his version of it, impede, rather than advance, the forward march of agriculture.

The experiments reported by J. M. G. are freely admitted to be relevant, strong and imposing, in favor of his adopted opinion of *surface manuring;* and it is much to be hoped he will continue them, and publish the results. To generalize from a few facts is hazardous, as he well knows, even though, as in the present case, they be forcibly characterized. And the more especially is it so, when, in competition with antagonistic principles of science, as is apparently the case in quest on.

In respect to my own pra ctical observation upon the subject, I can only say, it has been, as well as I could discern, quite co-incident with the principles which I have recited.

I have extended the discussion of this member of my proposed thesis, far beyond its intended limits. I must, therefore, defer the remaining two questions of "winter furrowing" and "drill planting," for a convenient occasion in future. JOSEPH E. MUSE.

IMMENSE SUCCESSIVE CROPS OF WHEAT.

MODE OF MANURING, ETC.

In our paper of the 21st ult. we gave an extract from an essay of S. H. Black, Esq., in which he stated that Adam Whann, Esq., of Elkton, Maryland, had raised wheat on a ten acre lot for four successive years; that the product had averaged 400 bushels per year, or 40 bushels to the acre; and that the lot was then in wheat making the fifth consecutive year. Appended to that extract, we made such comments as the extraordinary nature of the case appeared to justify, and respectfully called upon the venerable owner of the lot, to favor the public with answers to certain queries, which we took the liberty of submitting to him. To those queries Mr. Whann has made a prompt and satisfactory response, as will appear by the annexed communication.

There are two features about Mr. Whann's culture, that go to astound us. The first is, that such heavy crops should, without change, be grown for five successive years on the same land; and that such success should have attended his wheat crop after being manured with stable manure; for *that*, with the exception of the burning of the stubble one year, was the only manure which his lot received during the whole period it was in wheat. The growing of successive crops of the same grain upon the same land, and the manuring of wheat with stable manure, are both opposed to the approved theory of rotation of crops, and he who should undertake to do either, at this day, would be considered rather a bold experimenter, if not a daring innovator. In England, as well as in this country, it is considered that the rust, in a majority of cases, will attack any wheat thus manured, and yet in the case of Mr. Whann, although, in some instances, his neighbors' wheat was rusted, his escaped unscathed. It is not our intention to attempt to determine to what cause this immense product is to be ascribed, and for the very obvious reason that we feel unequal to such task; but it may be profitable to note the facts as presented, so as to elicit inquiry by experienced wheat growers. And with that object we will endeavor to present the results in such form as to be the most striking to the eye of the reader.

In the first place it may be well to remark, that the lot had been cleared for many years, and had been a considerable time in clover and timothy.

The following will show the course of treatment and crops:

First year—Corn; ploughed and harrowed; manured with clover lay; product of the ten-

acre lot, 850 bushels; product per acre, 85 bushels. Second year—Barley; ploughed and harrowed; without manure; product of the ten-acre lot, 350 bushels; product per acre, 35 bushels. Third year—Wheat; ploughed and harrowed twice; manured with stable manure; product of the ten-acre lot, 422 bushels; product per acre, 42 1-20 bushels. Fourth year—Wheat; ploughed and harrowed; manured with stable manure; product of the ten-acre lot, 400 bushels; product per acre, 40 bushels. Fifth year—Wheat; ploughed and harrowed; manured with stable manure and burned stubble; product of the ten-acre lot, 350 bushels; product per acre, 35 bushels. Sixth year—Wheat; ploughed and harrowed; manured with stable manure; product of the ten-acre lot, 400 bushels; product per acre, 40 bushels. Seventh year—Wheat; ploughed and harrowed; manured lightly with stable manure; product of the ten-acre lot, 300 bushels; product per acre, 30 bushels.

By examining the above, we find that this lot out of a course of culture of seven years, was five years in wheat; that during each of those latter years, the ground was enriched with stable manure, and that, notwithstanding the application of this heating substance, it continued to yield immense crops, making an average acreable product of more than 37 bushels of merchantable wheat; that the falling off in the last of the five years is accounted for by Mr. Whann, who ascribes it to his sowing white wheat instead of red, on one-half of it. The half in white only yielding 100 bushels, while that in red produced 200, being equal to any of the preceding years but the first, so that in fact, there could not be said to have been any falling off in product, that was not produced by an error in substituting one kind of wheat for another. Let us point out the system pursued by Mr. Whann:

He ploughed once and harrowed twice.

He sowed early, viz: on the 15th of September in each year.

He sowed two bushels to the acre.

He changed his seed each year.

He manured with stable manure and lime—

And the kind of wheat which he found best was the red chaff.

We think it was by his early sowing, that he was enabled to escape the rust, and may it not have been the vigorons growth of the wheat plants, superinduced by the stable manure, that induced them to resist the fly. We merely suggest this opinion, and will mention that Earl Stimson, of Saratoga county, New York, always makes his wheat crop the first in rotation, and manures it both with barn-yard manure and leached ashes, in the proportion of 5 loads of the former to 3 of the latter. His crops of wheat average from 30 to 40 bushels to the acre, in fields of 50 and 60 acres. We allude to this latter fact with the view of letting our readers see that Mr. Whann's case is not an isolated one, and that he does not stand solitary and alone, in the successful application of animal manure to wheat.

With these remarks we will call attention to the subjoined letter from our venerable and respected correspondent:

"*Elkton, Jan.* 6, 1843.

DEAR SIR: I observe in your paper of the 21st ult., a request that I should give you some information respecting five successive crops of wheat grown on a ten-acre lot, which formerly belonged to me at this place. The lot was clear of timber as long as I had any knowledge, except two or three black walnut trees. The soil is a light sandy loam mould; it had been in clover and timothy for some years, then put it in corn, and it produced 850 bushels of good sound corn, then ploughed the next spring, and 20 bushels of barley sowed, produced 350 bushels. That fall manured over with stable manure, ploughed once, and 20 bushels of good red chaff wheat sowed and harrowed each way. The produce was 422 bushels wheat, weighing 61 lbs. to the bushel; the second year manured over with stable manure and ploughed once as before, limed and harrowed in, produce 400 bushels. Third year being a very dry season, ploughed a few furrows round the lot and set fire to the stubble and turned it into the earth; then gave it a light coat of stable manure, ploughed once, limed and harrowed as before; produce 350 bushels. Fourth year covered over with stable manure, ploughed once and harrowed as before, produce 400 bushels. Fifth year covered over lightly with stable manure, ploughed once, limed and harrowed in as before, produce 300 bushels. I sowed my wheat about the 15th September, never ploughed but once a year, and harrowed in both ways, changing my seed every year. It was not disturbed by any insect during that time Some of my neighbors complained of the fly and rust affecting their crops, but mine was not affected with either. I attributed the small crop of the fifth year to my having seeded one-half the lot with white wheat—the produce of that half was only 100 bushels. ADAM WHANN.

American Farmer.

REPORT OF DR. PLAYFAIR'S LECTURE

BEFORE THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Dr. Playfair stated that the object of the lecture was to point out in what manner the principles of physiology, (especially those which had been lately developed by the chemical researches of Liebig,) might be applied to the grazing and fattening of cattle. In the first place, he should endeavor to give a clear conception of what the principles of physiology were, that were involved in the feeding and growth of animals.

Vegetables, in their growth, derive all their food from the mineral kingdom—principally from the air—which had been called a gaseous mineral; whilst animals derived their principal nutriment directly from the vegetable kingdom. Vegetables effected many chemical changes in the food they took up—animals, few.

Gluten and albumen are the nutrient principles of plants, and in chemical composition

they are identical with the albumen of the white of an egg, of the muscle of an ox, or the blood of a sheep. By identity was not meant similarity, but positively the same thing. The albumen of blood, of muscle, and of an egg, differed in physical but not in chemical characters. The composition of these substances, as analyzed by various chemists, from the animal and vegetable kingdom, as seen in the following table, prove their identity:

	Gluten. Boussingault.	Casein. Scherer.	Albumen. Jones.	Ox-blood. Playfair.	Ox-flesh. Playfair.
Carbon,	54.2	54.1	5.5	54.19	54.12
Hydrogen,	7.5	7.1	7.	7.5	7.89
Nitrogen,	1.4	15.6	15.7	15.72	15.71
Oxygen,	24.4	23.2	22.1	22.59	21.56

These analyses do not differ more than the analyses of the same substance. Plants, in fact, contain within them the flesh of animals, and all the animal organization does in nutrition is, to put this flesh in the right place. But animals take up with their food other constituents of plants which contain no nitrogen; such are starch, sugar, gum, &c. These are not nutritive principles; they do not assist in making the flesh of animals; and when animals are fed on these alone, they die. But animals possess a certain degree of heat, and their bodies have generally a temperature above that of the atmosphere—about 100 degrees of Farenheit's thermometer.

Whence then comes this heat? From the burning of the sugar, starch, gum, &c. The air that animals expire is carbonic acid, the very gas that is produced by the burning of wood or charcoal in a fire. Charcoal is carbon, and animals take in daily a large quantity of carbon in their food. It is the burning or combustion of this substance in the body, that produces animal heat. In hot countries, animals on this account take less carbon. The food of the East Indian contains only about 12 per cent. of carbon, whilst that of the Greenlander contains 70 per cent. The depraved taste of the Greenlander, who drinks train-oil and eats tallow candles by the dozen, might be pitied or wondered at; but it is necessary to his healthy existence. Another reason for animals acquiring carbonaceous food in cold climates is, that the air is more condensed, and the same measure contained a greater quantity of oxygen; that gas being the agent which, by uniting with the carbon and forming carbonic acid, gave out the heat. Strong exersise also demands a large supply of carbonaceous food, on account of the oxygen taken in during the hard breathing thus produced. Oxygen, when once taken into the system, never escapes uncombined, and would destroy the whole fabric of the body uuless a fresh supply of material was given. Clothes, by keeping in animal heat, rendered less carbonaceous food necessary in order to keep the body up to its proper temperature. The following table exhibits the principles of food necessary for the two great processes of life—nutrition and respiration:

Elements of Nutrition—Vegetable Fibrine,
" Albumen,
" Casein,
Animal Flesh,
" Blood.

Elements of Respiration—Fat,
Starch,
Gum,
Sugar,
Wine,
Spirits,
Beer.

If it were not for some power or force within the animal fabric, it would soon become a prey to the chemical action of oxygen. The force that withstands this action is vitality—a principle independent of the mind, and which constantly opposes the destructive chemical laws to which the body is subject. Disease is the temporary ascendency of the chemical over the vital force. Death is the victory of the chemical force. A dead body exposed to the action of oxygen is soon resolved into its primitive elements—carbon, hydrogen, and nitrogen, in the form of carbonic acid, ammonia and water, and these are the elements from which plants again prepare materials for the living body. These remarks will explain many facts known to the agriculturist, and will assist him in insuring more certainly many of the objects of his labors. It is very well known that cattle do not fatten so well in cold weather as in hot. The reason is this: The fat is a highly carbonized substance, formed by the animal from its carbonaceous food. In cold weather, the carbon in this food is consumed in keeping up the heat of the animal, which is at that season more rapidly carried off. This is also illustrated in an experiment made by Lord Ducie, at Whitfield. One hundred sheep were placed in a shed, and ate 20 lbs. of Swedes each per day; another hundred were placed in the open air, and ate 25 lbs. of Swedes per day; yet at the end of a certain period the sheep which were protected, although they had a fifth less food, weighed three pounds a head more than the unprotected sheep. The reason of this is obvious; the exposed sheep had their carbonaceous food consumed in keeping up their animal heat. Warmth is thus seen to be an equivalent for food. This is also illustrated by the fact that two hives of bees do not consume so much honey when together as when separate, on account of the warmth being greater; and they have less occasion for consuming the honey, which is their fuel.—Cattle, for the same reason, thrive much better when kept warm, than when exposed to the cold.

The cause of animals getting fat is, that they take in more carbonaceous food than they require for producing animal heat; the consequence is, that it is deposited in the cellular tissue in the form of fat. Fat is an unnatural production, and its accumulation is not necessary for the health of the body. When stored up, however, it will serve the body for keeping up its animal heat, and by this means its life, till it is all consumed. An instance is related of a fat pig having been kept without food for 160 days, sustaining life by its own fat.

Another element necessary to be taken into consideration in the fattening of animals, is motion or exercise. Every action of the body

—nay every thought of the mind, is attended with chemical change; a portion of the deposited tissues are thus being constantly consumed. It is on this account that when animals are fattened, they are kept quiet and still. The cruel practice of fattening geese by nailing their feet to the floor, and of cooping pigeons and chickens before they are killed, arises from a knowledge of this fact. When prizes were given by our agricultural societies for fat, and not for symmetry, animals were strictly prevented from taking any exercise at all. Mr. Childers found that sheep which were kept warm and quiet, fattened much faster than those that were allowed the open air and action. It is very difficult to fatten sheep and oxen in July, on account of the flies, which, stinging them, keep them in a state of constant motion. The Cornish miners, on account of the laborious nature of their occupations, consume more food than laborers with lighter work. During the late riots in Lancashire, the poor unemployed operatives found out that exercise and cold made them hungry; accordingly they kept quiet in bed, and heaped upon them all the covering they could find. Englishmen in the East Indies, are obliged to take a great deal of exercise, because they will insist on eating and drinking highly carbonized foods; and the heat of the climate not allowing the escape of much heat from the body, they are obliged to take in by exercise, the oxygen of the air, in order to destroy the carbon which would otherwise accumulate in the system, and produce liver disease. In the Scotch prisons, the quantity of food given to the prisoners is regulated by the kind of work on which the prisoners are engaged—the hardest workers having the most food. The reason of the flesh of the stag becoming putrid shortly after its death, arises from the quantity of oxygen which it takes into its system during the hard breathing of the chase. A hunted hare, for the same reason, is as tender as one that has been kept for a fortnight after being shot. The reason is the same. In both cases, the action of the oxygen on the flesh produces approaching decomposition—in the one, quickly; in the other, slowly. Bacon, on the same principle, was, at one time, rendered more delicate by whipping the pig to death. Epileptic fits produce great emaciation, on account of the violent action to which they expose the body.

Lord Ducie has performed some experiments highly illustrative of the foregoing general principles, and which also indicated what might be expected from their application to the practice of grazing:

1st experiment. Five sheep were fed in the open air between the 21st of Nov., and the 1st of December; they consumed 90 lbs. of food per day, the temperature of the atmosphere being about 44 deg. At the end of this time they weighed 2 lbs. less than when first exposed.

2d experiment. Five sheep were placed under a shed and allowed to run about, at a temperature of 49 deg.; they consumed at first 82 lbs of food per day; then 70 lbs.; and at the end of the time had increased in weight 23 lbs.

3d experiment. Five sheep were placed in same shed as in the last experiment, but not allowed to take any exercise; they ate at first 64 lbs. of food per day; then 58 lbs.; and increased in weight 30 lbs.

4th experiment. Five sheep were kept quiet and covered, and in the dark: they ate 35 lbs. a day, and were increased 8 lbs.

These experiments prove very satisfactorily the influence of warmth and motion on the fattening of cattle.

Dr. Playfair then stated that he should proceed to examine the different kinds of food of cattle. The food of the cattle is of two kinds —azotised and unazotised—with or without nitrogen. The following table gives the analysis of various kinds of food of cattle in their fresh state:

Lbs.		Water.	Organic matters.	Ashes.
100	Peas,	16	80½	3½
"	Beans,	14	82½	3½
"	Lentils,	16	81	3
"	Oats,	18	79	3
"	Oatmeal,	9	89	2
"	Barley meal,	15½	82½	2
"	Hay,	16	76½	7½
"	Wheat straw,	18	79	3
"	Turnips,	89	10	1
"	Swedes,	85	14	1
"	Mang. wurzel,	89	10	1
"	White carrot,	87	12	1
"	Potatoes,	72	27	1
"	Red beet,	89	10	1
"	Linseed cake,	17	75½	7½
"	Bran,	14½	80½	5

A glance at this table would enable a person to estimate the value of the articles as diet.—Thus every 100 tons of turnips contain 90 tons of water. But the value of the inorganic and organic matters which these foods contained, differed. Thus Mr. Rham states that 100 lbs. of hay are equal to 339 lbs. of mangel wurzel. It would be seen by the table, that that quantity of hay contained 76 lbs. of organic matter, whilst the mangel wurzel contained only 34 lbs.

One result of feeding animals on foods containing much water is, that the water abstracts from the animal a large quantity of heat, for the purpose of bringing it up to the temperature of the body, and in this way, a loss of material took place. The mode proposed by Sir Humphrey Davy, of ascertaining the nutritive properties of plants, by mechanically separating the gluten, is unsusceptible of accuracy. The more accurate way is to ascertain the quantity of nitrogen, which being multiplied by 6-2 will give the quantity of albumen contained in any given specimen of food. The following is a table of the equivalent value of several kinds of food, with reference to the formation of muscle and fat; the albumen indicating the *muscle*-forming principle—the unazotised matters indicating the *fat*-forming principle:

Lbs.		Albumen.	Unazotised matter.
100	Flesh	25	0
"	Blood,	29	0
"	Peas,	29	51½
"	Beans,	31	52

100	Lentils,	33	48
"	Potatoes,	2	24½
"	Oats,	10½	68
"	Barley meal,	14	68
"	Hay,	8	68½
"	Turnips,	1	9
"	Carrots,	2	10
"	Red beet,	1½	8½

The analyses in this table are partly Dr. Playfair's and partly Boussingault's. The albumen series indicate the flesh forming principles, and the unazotised series indicate the fat-forming principles. By comparing this table with the former, it will at once be seen which foods contain not only the greatest quantity of organic matter, but what proportion of this organic matter is nutritive, and which is fattening; or that which furnishes living tissue, and that which furnishes combustible material. In cold weather, those foods should be given which contain the larger proportion of unazotised matters in order to sustain the heat of the body. Thus it will be seen that potatoes are good for fattening, but bad for fleshening. Linseed cake contains a great deal of fattening matter, and but little nutritive matter; hence, barley meal, which contains a good deal of albumen, may be advantageously mixed with it. Dumas, a French chemist, states that the principle of fat exists in vegetables, as in hay and maize, and that, like albumen, it is deposited in the tissues unchanged. But Liebig regards fat as transformed sugar, starch, gum, &c., which has undergone a change in the process of digestion.—This is why linseed cake is fattening: all the oil is squeezed out of the seed, but the seed-coat, which contains a great deal of gum, and the starch of the seed is left, and these are fattening principles. The oxygen introduced by respiration into the lungs, is destined for the destruction of carbonaceous matter, but there is a provision made for taking it into the stomach with the food, and this is done by the saliva. The saliva is always full of bubbles, which are air bubbles, which carry the oxygen of the atmosphere into the stomach with the food. The object of rumination in animals is the more perfect mixing of the food with the oxygen of the air. This is why chaff should not be cut so short for ruminating, as for non-ruminating animals, as the shorter the chaff is, the less it is ruminated, and the less the oxygen it gets. Chaff is cut one inch for the ox, half an inch for the sheep, and a quarter for the horse. Some might, in consequence of this, suppose that cutting food is then of little use; but when it is considered that rumination is a strong exercise, or that an animal will not be eating more food that is ruminating, it will easily be seen how cutting facilitates fattening. In order that food may be properly ruminated, it requires a certain amount of consistency and bulk; hence all watery foods, as turnips and mangel wurzel, should be mixed with straw. The opinion is very correct, that an animal "cannot chew its food without straw." An important inorganic constituent of the food is salt; it is a chloride of sodium. Whilst the chlorine goes to form the gastric juice, which is so important an agent in digestion, the soda goes to form the bile which is a compound of soda. The bile is, in fact, a secondary combination, by which the carbonaceous matter is brought in contact with the oxygen, in order to be burnt. It is thus that common salt becomes so important and necessary an article of diet. In the series of changes by which the oxygen of the air is brought in contact with the carbonaceous matters in the body, iron plays an important part, and is hence one of the necessary ingredients of animal food. There are two oxides of iron—the peroxide and the protoxide; the first containing a large quantity of oxygen, the second a smaller quantity; the first, on being introduced into the blood, gives up a portion of its oxygen to the carbonaceous material of the bile, carbonic acid and protoxide of iron being formed; these two unite, forming a carbonate of the protoxide of iron, which, on being carried to the lungs, gives off its carbonic acid, and the protoxide of iron absorbing the oxygen brought into the lungs by respiration, forms again a peroxide, which again goes into the circuiation, and meeting with carbonaceous matters of the bile, unites with them, and produces again and again the same series of changes. The small quantity, then, of inorganic ingredients in the food, performs very important functions; and in the absence of them, animals would die.

Remarks by the Editor of the N. E. Farmer.

The preceding article we gladly lay before our readers, believing they will take much interest in seeing the course which scientific men are taking, in the hope of doing good service to agriculture, and to man. The experiment with sheep, which shows that quiet and warmth are favorable to growth, and may be in part a substitute for food, shows nothing different from the result to which observation has long since led many a common farmer; but *the why—the reason*, has not been known. This reason, according to Liebig, is, that in cold weather more of the carbon of the food is required to keep up the animal heat; and also that when *in exercise*, more of the carbon must be consumed, because more oxygen is taken into the system by the quicker or deeper breathing;—this rapid consumption would soon raise the animal heat too high, were there not provision for letting it off through the skin and other ways. What is thus let off is wasted, so far as relates to growth. From the experiment we learn nothing but *the reason* of results which have long been known.

The tables in the above article give us valuable information as far as it goes; and it gives hope of something more. The whole article, however, stops short of where we wish science to lead us. We are told how many pounds of matter there are in an hundred pounds of potatoes, that will go to make muscle or flesh as distinguished from *fat*; also how many pounds that may go to make *fat*. All this is well. But there are other things the action of which is not told, viz: the water and the ashes—or rather the salts in the ashes. Does the water in potatoes have upon an animal precisely the same effect as would be pro-

duced by the same quantity of pure water drank in separately?—and what salts are found in the ashes of each kind of food—in what quantity, and what is their effect upon the animal that consumes the food? These are questions not yet answered, but which must be answered before chemistry does all that we ask at her hands.

Taking the water from the articles named in the foregoing tables, and calling the remainders of equal value as food, pound per pound, the calculation, if we have made no mistake, would show results nearly as follows:

			Bushels.
100 lbs. of hay equal in worth to		potatoes	5
"	"	turnips	14
"	"	beets	14
"	"	w. carrots	12
"	"	ruta bagas	10
"	"	oats	3
"	"	barley meal	2

Now, estimating hay at 80 cts. per 100 lbs.,

			Cents.
Potatoes will be worth per bush.			16
Turnips,	"	"	5 2-3
Beets,	"	"	5 2-3
White carrots,	"	"	6 2-3
Ruta bagas,	"	"	8
Oats,	"	"	27
Barley meal,	"	"	40

These figures would make hay the most economical food. Practically, however, hay will not be so valuable comparatively, as it appears here. This may be owing in part to the fact that a portion of the hay passes through animals undigested; and in part, perhaps, to the quantity and character of its salts. The animal's stomach will often do its work much less thoroughly than the chemist's crucible, and we should expect the chemist to find more nutriment in hay and oats than the animal can extract. The opinion of Dr. Playfair, that 6 bushels of turnips may be equal in value as food, to 100 pounds of hay, may be *near* the truth—but we should think that the hay would be found worth a little the most: we should take seven bushels. Our table of values then will be—

100 lbs of hay equal to	potatoes,	2½	bush.
" "	" turnips,	7	"
" "	" beets,	7	"
" "	" white carrots	6	"
" "	" ruta bagas,	5	"

The hay being at 80 cts., we shall have the following:

Potatoes	worth	32 cts.	per bush.
Turnips	"	11 1-3	"
Beets	"	11 1-3	"
White carrots,	"	13 1-3	"
Ruta bagas,	"	16	"

From this it will follow, that among the roots (?) potatoes will be most profitable in those sections of the country, where the crop is usually a safe and good one. But on many farms, the 5 bushels of ruta bagas can be produced at less expense than the 2½ of potatoes. On many farms, also, the 6 bushels of white carrots will cost not more than the 2½ of potatoes.

From the tables in the article above, it will appear that for fattening, potatoes are best; while for giving muscle and strength, they are poorest. Carrots and barley meal are best for working animals, among the substances named.

We wish some competent chemist would give us the analysis of Indian meal and of ruta bagas. We will venture the prediction, from observation, that the ruta baga will be found best of all the roots for giving muscle—that they are best for working animals. But the analyses will not satisfy us until we find what the ashes contain. The salts, probably, have much greater action, in proportion to their quantity, upon the animal system, than do the organized matters in the roots. Let chemistry show us their constituents and operation, and we can then the better judge whether *its* teachings are supported by *our* experience.

Albany Cultivator.

SALT.

Andover, Feb. 5. 1843.

Mr. Editor:—I will give your readers some account of the benefit of salt, as it is becoming an important article among farmers. I observed two years ago in the town of Stow, an acre of land set with fruit trees of different kinds, and I took notice that one half of the trees were one third larger than the others; and I also observed that where the trees were largest the land was moist, while the other part was dry. That half of the acre that was moist, and on which the trees were largest, was sown over with two and a half bushels of salt, four years before; the other part was dressed with two cords of manure. The part manured with salt appeared as though there had just been a shower upon it; while the other part was dry and dusty. On the part to which salt was applied, the trees were smooth and thrifty; on the other part, the trees were rough and backward. Salt is good to destroy insects that are injurious to fruit. By mixing it with peat mud, and laying it around fruit trees, early in the spring, it will destroy the insects that often injure the plum, the apple and peach tree.

GEORGE W. MAYNARD.

Boston Cultivator.

REPORT OF COMMISSIONER OF THE PATENT OFFICE.

We have received from H. L. Ellsworth, commissioner of the Patent Office, a copy of his report to congress, showing the progress which has been made in the mechanic arts, and in industrial, rural and domestic economy, for the year 1842, with tabular statements of population, production, &c. It is one of the most valuable and interesting documents we have ever perused; valuable and interesting

to the whole country at large for the amount of information it contains, and for the clearness with which it exhibits the important changes which are taking place in the relative value of some of our agricultural products, the result of new discoveries in science, and in part also of some modification in the commercial relations between our own and foreign countries. It is a document which has been drawn up with the utmost care, and which reflects great credit on the public spirit of the author. The topics embraced in the report are enumerated in the following communication.

Patent Office, January, 31, 1843.

Dear sir: Allow me to say that I shall this day forward to the speaker my annual report; and beg leave to remark that I have, during the year past, taken much pains to collect facts and statistics, which I hope will be interesting to the community.

In addition to the ordinary details of the office, which show a net surplus of over $5,000, I have presented

1st. The census of the inhabitants in each state and territory up to January, 1843.

2d. The amount of agricultural products, and the surplus, with the causes of failures in some states.

3d. The disposition of this, and the increasing surplus, by diversion of labor or exportation.

4th. The present value of American produce in foreign markets, with price of freights, &c.

5th. The tariffs of foreign nations on our agricultural products.

6th. The ability of this country to compete with continental Europe in the British market.

7th. The colonial tariff of Canada.

8th. The admission of American produce into England via Canada, at colonial duties, especially the operation of the duty on wheat and flour after July next.

9th. The experiments of sugar-making from corn-stalks in the different states, with directions how to overcome remaining difficulties.

10th. Manufacture of oil and candles from lard; our ability to export $100,000,000 annually.

11th. The comparative value of sperm oil and lard oil, as tested by numerous experiments.

12th. An improved mode of enclosing prairie lands, and the better mode of cultivating timber lands.

13th. An economical mode of building, especially on the prairies, and all places where timber is scarce; together with many other suggestions for the improvement of agriculture.

Much of the information is given in a tabular form, accompanied with a few plates, to be impressed with wood cuts (at a very trifling expense) explanatory.

To avoid importunities, I have added instruction for the manufacture of corn-stalk sugar, and also oil and candles from lard. As the session is so short, will not the house consent to receive the report, and order it to be printed, as some matters suggested may require correction? Should it seem late to present the report, I would observe that the law allows me the month of January to complete it, and the desire to embody the latest information from Europe and the Canadas, will, I trust, appear satisfactory. Respectfully yours, HENRY L. ELLSWORTH.

Hon. Robert McClellan, chairman of the Committee on Patents, House of Representatives.

On the subject of COTTON, which is by far the most important article of export from the United States, the apprehension that its value will be diminished, and indeed that the cotton culture of this country may be finally prostrated by foreign competition, appear to be confirmed by this report:

The entire aggregate of the cotton crop for the year 1842 is 683,333,231 pounds.

The present low price of cotton will probably turn off a portion of the laboring force usually thus employed to the cultivation of some other products. A planter of Alabama asserts that, by an improved process of culture, he has been enabled to raise from 3,000 to 5,000 pounds per acre on land which, under the usual system, would not yield more than from 300 to 500 pounds. In one of his letters to the editors of the Albany Cultivator, he even says that he has actually picked the enormous quantity of 5,989 pounds on an acre, and affirms that he is prepared to prove satisfactorily "that it is perfectly practicable to produce the 2,000,000 bags—the cotton crop of the United States—with *one-third* of the capital engaged, under the present system of culture in its production." Without any definite information as to his process, no opinion can be formed of its practicability. It seems, however, incredible; and no reliance should be placed on such prospects, until thoroughly examined and demonstrated conclusively by the test of rigid experiments.

Although the experiment of raising cotton in India has partially proved a failure, on account of the hot weather, winds, &c., as in the Bengal district, yet in some of the trials it has furnished so great encouragement that we have reason to believe it will not be abandoned. The comparison of the cotton imported into England from India and the United States shows a steady advance on the amount received from the former country. Thus, in 1841, there was received from the United States 902,191 bales, from India 274,984 bales —being nearly equal to the entire consumption of cotton in the United States in 1840 and 1841, and more than one-fourth of the amount sent that year from this country; being also 50,000 pounds more than in the preceding year, in which the increase was at least 30,000 pounds. To show how this subject is viewed abroad, and without pretending to say how far the reasoning is justified by the assumed

facts, we may here quote an extract or two from the letter of an intelligent writer from Liverpool, to his friend in Boston. He says: "When in the cotton-growing section of the states, I was induced to think the India effort on the part of the Government would prove a failure. I based this calculation upon these data, that the skill, machinery, fertility of soil, cheapness of conveyance, and nearness to us, would enable the Americans to put down any competition. Since my return, I have conversed with a friend from India, who resided for a long time in Charleston, and was familiar with cotton growing, and who is now engaged in its cultivation in the east, and from facts furnished to me by him, I am satisfied I was wrong.

"The experiment in India will succeed, an the success will be both rapid and permanent. They will not only grow the cotton, but they will manufacture it, and supply us, besides, with large quantities of the raw material. What effect, you may ask, will this have upon the states? The first will be to drive the Americans out of the South American markets. In India, they manufacture a coarse fabric (which just suits that market) cheaper than the Americans possibly can, and consequently they will have in turn to yield. They can do a great deal more than most people, but they cannot compete with pauper labor, or the cheap work of India, unless helped by home duties. The second effect must be to change the cultivation of a large number of the states engaged in the growth of cotton. The rich alluvial bottoms of the Mississippi may enable the planter there to cultivate cotton at four or five cents, with profit—I suppose it will; but in Georgia and the Carolinas, if I am any judge of soil, it cannot be done. If I remember right, the average crop in those states would not be more than 300 pounds to the acre; and if so, cotton-growing there will be a losing business."

Whether or not there is the immediate danger this writer predicts, of breaking up the cotton trade of several states, the subject is one which, at least, demands attention. The evil may be more remote, but it can scarcely be doubted that a serious competition is threatened from a number of sources. It appears, from information from high authority, that the British manufacturer has already begun to supply a cheaper article, made of India cotton, to the South American market, at three cents a yard *cheaper*, and threatens to destroy effectually that market for our countrymen. If Texas becomes established on a firm footing, and at peace, so that her rich soil may be brought under productive cultivation, she will prove a powerful rival in raising this crop, and contending for the cotton trade.

The attention of the French Government likewise is directed to means to advance the culture of this product in French Guiana; and the increase of it also in Egypt, though not indeed rapid, must be taken into consideration, in estimating the probabilities of competition. Eventually, Africa, on the western coast, may furnish cotton at a moderate price; though this cannot be for many years to come. The amount of the new crop of this year imported into Boston, coastwise, from 1st of October to 31st December, exceeds the amount of the previous year, for the same period, by about 9,500 bales. The fact that Great Britain is directing her energies to extend her territory, and open for herself markets, by commercial treaties as well as by conquest, where she can, and especially that she has avowed, and still avows, her determination to become independent of us in respect to cotton, should teach us that she will never relinquish her purpose without, at least, a most severe struggle. The planter, therefore, must expect competition with the world over wherever cotton can be produced; and that it can be on nearly one-third of the habitable globe, we have high authority for believing. While such competition continues, no great advance can be hoped for in the price of our own, especially so long as the great Powers of Europe are at peace with each other. One thing, however, is certain, that no country can raise better cotton than the United States; and the reduction of wages and peculiar adaptation of soil and climate will, it is believed, enable the American planter to contend successfully in competition for many years to come.—pp. 23, 25.

In proportion. however, as one great production of our country declines in value, it is confidently anticipated that others, the culture of which is equally practicable and no less profitable, will be gradually introduced. Indeed, according to this report, a great revolution is in progress, and new products of immense value will be added to our resources. We extract the observations of the author on the probable results to be derived from the manufacture of

CORN STALK SUGAR.

Numerous experiments have been tried in various parts of the country, the past year, with respect to obtaining sugar from the corn stalk.

It could, indeed, hardly be expected that persons entering into it without much knowledge of the process of manufacture, and, in many cases, never having been furnished with any plan on which to conduct it, and possessing no requisite machinery, and before the difficulties attending its granulation had been removed, would be successful in their efforts. Yet the results have every where been so satisfactory, that, though but little sugar has been made, not one person from whom we have heard, expresses a doubt of its entire practicability, or the least discouragement. On the contrary, they, one and all, confidently assert that the product will yet become a great staple in our country. An excellent molasses, or sirup, has usually been obtained; and were this the only thing secured, yet, in this point of view, it would doubtless prove a great desideratum.

Mr. Webb, of Wilmington, Delaware, to whom the country is so particularly indebted for introducing this discovery to notice, and for his perseverance in demonstrating its practicability, made a definite experiment on a certain amount of land, sown as he had before recommended. Speaking of his former views, he says: "These anticipations have been more and *more confirmed by every succeeding step in the investigation.*" He says further: "There was no deficiency in the *corn;* it was entirely in our mode of treating it; and, after all, the failure was only in crystallization." It appears that the corn was fully ripe before the least preparation had been made for manufacturing it; and, after this, delays were occasioned by breakages, incident to new machinery, by which the progress was so hindered that a considerable part of the crop was killed by the frost before it could be ground. He goes on to observe that the greatest part of the sugar he obtained was from this frost-killed corn, and says: "This fact is important, as it shows the superiority of corn over the cane." In this point it would seem he is mistaken, according to the account above given of the cane crop of Louisiana. He further says: "We obtained 50 gallons of sirup, which (being boiled to the density of sugar) was much richer and better than the best sugar-house molasses; part of it was sold at $1 per gallon. We also had 10 gallons of sirup evaporated in broad shallow vessels; this crystallized readily, and made good sugar." Again: "Besides the products above mentioned, we obtained from the acre about 40 gallons of vinegar. The fodder was equal in value to two tons of hay; and there were 20 cart loads of stalks, after passing the mill. One-fourth of the crop was lost, in consequence of being prostrated by a storm late in the season, and another fourth from the stalk being imperfectly pressed. Considering every thing, the result is satisfactory." For further particulars of his process of evaporation, reference may be had to the Appendix, No. 2. A fair review of the progress of this experiment fully justifies his language: "I do not think that any manufacture ever promised better, in the early stages of its introduction." In the Farmer's Cabinet for January, 1843, a correspondent of that journal, whose opinion seems entitled to consideration, remarks: "Few persons would be apt to calculate the expense attendant on even a small experiment in the making of sugar, whether from the cane, the beet, or the corn stalk; all who know any thing about it, however, are aware of the fact, that the process, even from the first, is proverbially laborious, careful, and expensive."

"Mr. Webb's apparatus cost him about $300. I should rather add $1,000 to that sum. In my own opinion, the cause of the failure in the attempts to make sugar from the beet has arisen from the single circumstance of its never having been taken up on a sufficiently extensive scale. In France, there is no difficulty or delay experienced; but there the machinery is equal to the labor required." The writer also refers to Mr. T. Morgan, of Louisiana, and says "that, according to his experience, the juice of the cornstalk, as stated by the saccharometer, is *two tenths* stronger than the juice of the Louisiana sugar cane—a circumstance accounted for by the fact that the cane does not fully ripen in Louisiana, so that the juice is incipient."

On the other hand, the corn ripens perfectly, and then affords a juice properly corrected and matured, and hence defecation of it is remarkably easy. He further says: "I have been informed that Mr. Morgan was so well satisfied of the cultivation of the cornstalk, for the purpose of making sugar, that he, the last year, gave orders for the growth of a certain breadth on his sugar plantation, in Louisiana, the past summer, so as to give him a full boiling of juice for his vacuum pan, that the trial might be made on a scale sufficient to produce actual results, by which to calculate, in a pecuniary point of view, the real value of the corn stalk in the manufacturing of sugar, but that his intentions were frustrated, levelled to the dust, by a storm, which prostrated the corn, and entirely ruined his prospects. Speaking of some samples of sugar manufactured by Mr. Webb, he says: "It has been objected, that the grains are not so large and fully developed; it is only a wonder that any grains at all should be made to appear, from the manner in which the granulating process had been compelled to be carried on. Mr. Morgan, with his 10,000 gallons of liquor, at 45°, would soon be able to give a better account of the matter."

Mr. Blake, of Indianapolis, in Indiana, also tried an experiment on a larger scale; but not having as much previous knowledge of the process as Mr. Webb had, did not succeed in obtaining sugar. He says that he made, in all, out of about 4½ acres, about 270 or 280 gallons of thick sirup; 25 *gallons of the juice made* 4 *gallons of this sirup;* and he is well assured that he left in the ground corn one-third of the juice. His corn was planted four feet wide, and drilled one way. He planted about six acres, but a portion of it was prostrated by a storm, and so was not used. He found that wooden cogs and journals for the mill would not answer, and recommends iron-bound and iron-plated, and metal cogs and journals. He had no previous knowledge of sugar-making, of any kind, and of course had to encounter all the difficulties of a learner. For boiling, he used common 15 gallon iron kettles. The great difficulty he found was in arriving at the graining point in boiling. His plan was to boil the juice of the corn stalk, as soon as the scum was removed, down to a strong sirup, and then put it into a cooler, or large tub, having two or three inch holes, one in a level with the bottom, the others an inch and a half from the bottom, and let it remain to the next day, and then boil it down to the graining point. He says also, "my main object in trying the experiment was to ascertain whether cornstalk contained saccharine sufficient to make it an object to cultivate it hereafter, as one of the great staples of our state. On this point, I am satisfied that, in a few years, it will become an article of export

and of great value to the west." "My molasses is esteemed, by all who taste it, to be superior to New Orleans." "From experiments I made when I had got my mill to work well, I could grind 300 gallons of juice in about 18 hours' work, with two horses, allowing one hour for each horse at a time; two boys could attend the mill with ease."

"From the best estimate I can make of the cost per acre, in removing the ears, blading, topping and cutting, hauling, grinding and boiling, &., it was between 12 and 15 dollars. Of course, it would have cost much less, if I had been as well organized as I could be, were I to carry on the business upon the same scale hereafter; boys can do most of the work." He also expresses his full intention to go into the business with a view to permanency and profit.

Others also, in Indiana, tried the experiment with various success, and by a communication from Mr. Plummer, of Richmond, in that state, it appears that, in all cases, the success equalled expectations as to the quantity per average acre; but the quality was not so fine as expected, and it was supposed some added more cream of lime than was necessary. The sugar, however, proved equal to about second quality New Orleans. He also remarks, that they found wooden rollers would not answer as well, as they were liable to cut in ridges, and thus much of the saccharine matter was lost. He further suggests, that, by planting the corn some days apart from each other, one mill might serve a number of persons, and thus the expense be lessened. The farmers there he adds, as an evidence of their confidence, do not expect to open their sugar trees again.

The conclusion is expressed by several, that from 600 to 1,000 pounds of sugar may easily be procured from an acre.

Another person speaks of obtaining half a gallon of sirup from a bushel and a half of crushed stalks. Mr. Goodrich, of Terre Haute, in Indiana, is also stated to have produced from eight gallons of juice two gallons of molasses, pronounced by competent judges equal to the best sugar-house molasses.

Mr. James T. Gifford, who tried some experiments with the corn stalk, on examination, found that the butt of the stalk remaining in the field retained its juice and saccharine matter until the hard freezing in November caused fermentation to commence, from which time the saccharine matter was too acid. It is also said, that sugar has been made of the water in which the ears of corn have been boiled; from whence it has been inferred that the cob contains much saccharine matter. Mr. Knapp, of Waynesville, Illinois, in a communication made to the Union Agriculturist, for October, published at Chicago, says: "I hasten to say, briefly, that I have made about six gallons of maize molasses, from what was judged (not measured) a barrel of expressed juice of the stalks. I find there is no difficulty whatever in clarifying the juice with hydrate of lime, skimming until it boils, and then straining through flannel. An immense quantity of extractive matter in the form of a fawn-colored precipitate is thus speedily got rid of, and the evaporation is then conducted in the same manner as in making maple sugar. There are two other mills in this neighborhood. At one of them, sixty gallons of molasses have been made from an acre. In regard to crystallization, I entertain no scruples, when the evaporation is conducted properly and carried to the proper points." The experiment has been also tried, it is said, in South Carolina, even to granulation, without difficulty, with perfect success; and confidence in its importance as a product is expressed.

In the number of the Albany Cultivator for January, 1843, a correspondent writes from Ohio, and, referring to an experiment of his own, says: "The result of this experiment has led me to the following conclusions:

"1st. That Mr. Webb's statement of the amount of sugar which can be made from an acre is not overrated.

"2d. That stripping the ears from the stalk is essential to the production of sugar, though not essential in the production of a much smaller quantity of excellent molasses.

"3d. That large stalks yield much more juice than small ones in proportion to their size, and that, consequently, the corn should be grown in drills, and not by sowing broadcast.

"4th. That the principal labor in making sugar from cornstalks consists in stripping off the leaves, and that this is most expeditiously accomplished before the stalks are cut.

"5th. That three quarts of juice will yield saccharine matter equal to one pound of sugar; or that eight gallons of juice will make one gallon of thick molasses.

"6th. That the manufacture of sugar from cornstalks is an object well worthy the attention of every family who has even one acre of ground to cultivate."

Such are some of the results of very imperfect experiments, the first year after the announcement of the fact that sugar can be made from the corn stalk. They were commenced and prosecuted, in most cases, with the simple view of deciding a question on which, probably, nearly all who had just learned that such a thing was asserted were, to say the least, somewhat skeptical. They, too, had no conveniences for the manufacture; and yet, with all these drawbacks to success, the question may be considered as fairly settled by a number of independent witnesses who need only a knowledge of the process, and skill and experience in conducting the trial hereafter, to ensure complete success. In order to aid in this desirable object, and as so many are interested in whatever may throw light on the subject, Mr. Webb's account, originally drawn up for the National Agricultural Society, will be subjoined in Appendix No. 3.

As numerous inquiries also have been made respecting the best process of clarification, a communication detailing the mode has been obtained from Professor Mapes, of New York, who has paid much attention to the subject, which will be found in Appendix No. 4. He, also, as will be perceived, expresses his conviction, from some experiments on the corn stalk, of its entire superiority over the sugar

cane, if the enthusiasm of those who made the former experiments published did not lead them into errors.

The French scientific journals contain some notice of this subject, and a belief is there expressed that sugar can be manufactured from the corn stalk, and from the *fig cactus* found in the recent French possessions in Africa.

There are some facts stated in relation to the manufacture of sugar from the cane, which, as they may apply also to that from the corn stalk, it is thought proper to subjoin, They have been mostly derived from Porter's Treatise on the culture of the cane. At 10° of Beaume's saccharometer, it is said, there are in 100 lbs. of cane juice or sirup 18 lbs. 6 oz. and 1 dr. of sugar. This, it will be perceived, is not more, if as much, as Mr. Knapp and others obtained from the corn stalk. The weight of water, besides what is termed the water of solution, to be evaporated to reduce the cane juice to a state of saturated solution, is 70 lbs. 9 oz. 6 dr. A saturated solution of cane juice contains five parts of sugar and 3 parts of water. This is indicated by 34° of Beaume at the temperature of 82 Fahrenheit. Seventeen ounces of lime are used for 300 gallons of cane juice. The greatest danger seems to be of using too large a proportion of alkali. The highest produce of 100 gallons of cane juice for nine years average, on an acre of an estate selected in Jamaica, is stated to have been 122 lbs. of sugar. The experiments above cited, with respect to cornstalk, would show an equal, if not a greater average. It is evident, that the whole difficulty of granulation may be obviated by boiling immediately and quickly in not too large quantities. The paper of Professor Mapes, in the Appendix, already referred to, will also furnish valuable information on this point. The southern states, who have heretofore been engaged in the manufacture of cane sugar, possess peculiar advantages in this respect, as they are already provided with the requisite machinery for grinding and boiling, and can apply their already acquired skill, no doubt with great effect. Hence, we need not be surprised, if we should hereafter find them taking the lead in this business. It is a truly gratifying reflection, that, while the temperance reformation is so greatly lessening the consumption of corn in the manufacture of whisky, the introduction of this manufacture of cornstalk sugar promises to furnish a much more profitable as well as salutary application.—pp. 30, 35.

The most astonishing progress has been made in the manufacture of LARD OIL; and the uses to which it may be applied will exercise a great influence, not only in promoting the more extensive rearing of hogs in the west, but on account of the profits to be derived from the new applications of lard, in diminishing the supplies of meat for which the Atlantic states have been in a great measure dependent on the west; or, which amounts to the same thing, in their having to pay a higher price for those supplies. According to the report of the commissioner, whose remarks on this subject are annexed, the export value of this new product is probably bly destined to exceed that of all others combined.

LARD OIL, ETC.

The subject of the manufacture of oil from corn and lard was introduced to the notice of the public in the report of last year. As corn oil has heretofore been connected with distillation, although it is easily made and answers a good purpose, less attention has been devoted to it. It has been suggested, on high authority, that it can be gathered from the mash which is prepared by fermentation for feeding swine. If this should be confirmed by further experiments, as it would not be liable to the same objection urged against the former, the manufacture of spirituous liquors, it may hereafter be carried on to a great extent. No doubt seems to be entertained of its value for burning, and all other purposes to which oil is applied but painting.

Much interest has been felt in the subject of oil from lard, and the almost daily inquiries respecting its process of manufacture, &c., and its close connexion with the question of disposing of our agricultural products, forms a reason for giving it a more extended consideration in these remarks. Complete success has attended the enterprise, and the number of those engaged in prosecuting the business is continually increasing. Several large factories for the manufacture of this oil have been some time in operation in Cincinnati, and thousands of gallons are daily prepared for home consumption and exportation. It is also carried on at Cleveland, Ohio; Chicago, Illinois; Burlington, Iowa; Hannibal, Missouri; and other places both in the western and Atlantic states.

It is considered much superior to olive or sperm oil for machinery and for the manufacture of woollens, &c. It can be furnished also at half the price, and therefore it will doubtless supersede that article of import. As it contains less gelatine than other oils it is found much better for combing wool, for which purpose a single factory wished to contract for 10,000 gallons from one establishment. It is also undergoing trial in England; and, if it succeeds, of which there can scarcely be a doubt, large orders for it may be expected, or at least the American lard itself, which pays a less duty, will find a ready market. An order for 600 gallons, with this view, has already been received for the use of a cloth factory in Huddersfield, England. It has also been stated in the journals, that a gentleman is about taking out a large quantity, recently ordered from the west, for the purpose of trying it there as an article of trade; and it has lately been stated that 16,000 bbls. have been sent from Cincinnati to England. Repeated experiments, too, have shown that for the purpose of com-

bustion no oil is superior. It is important, in trying it with this view, to obtain a good article, manufactured from good lard, and not from the dark-burned which creates smoke and clogs the flame. For want of sufficient care in this respect, some have no doubt met with disappointment in their attempts to substitute this oil for sperm oil in the lamps.

The following are given as the relative constituents of lard oil and sperm oil, in 100 parts of either:

	Carbon.	Hydrogen.	Oxygen
Lard oil	79.03	11.422	9.548
Sperm oil	79.05	11.6	8.9

It will thus be seen that the difference in carbon is only $\frac{2}{100}$; about the same in hydrogen; while in oxygen it is about $\frac{4}{10}$ in favor of the lard oil. The large quantity of carbon proves that it may be relied on as a material for giving light, as it is well ascertained that whenever carbon predominates in an animal oil, the article is capable of a high degree of luminous power. Experiments have been made by Mr. Campbell Morfit, of Philadelphia, which may be found mentioned in the paper furnished by him in Appendix No. 8. These resulted in favor of lard oil. About 60 lbs. in 100 of good lard, in tallow only 28 is oil; and the processes of manufacture resorted to, show that it may be made a profitable business. Large orders have already been executed at the west for this oil, to be used in the eastern states. The heat of lard oil for the blow pipe has been found to be much greater than that of sperm. Lard itself melts at 82° of Fahrenheit; its specific gravity at 60° is 0.938. Lard crystallizes in small globules; sperm in flakes or scales. It is soluble in boiling alcohol. The proportion is 80 gallons of lard to 1 of alcohol. The application of stearin for candles, which was also alluded to in the last year's report, promises greatly to reduce the price of that article, as will be seen by Mr. Morfit's letter, already alluded to in the Appendix No. 8. He thinks that the price of such candles, equal to spermaceti, may be eventually reduced to 12½ cents per pound.

As the capillary attraction of lard oil is not so great as that of sperm, it is recommended that the form of the lamp should be such as to bring the bulk of the oil as near to the point of combustion as possible.

It is also recommended, that the tube should be filed thinner at the top where the wick is inserted to prevent the escape of heat. Various lamps have been constructed for burning lard as well as lard oil, which have been found to answer very well. The solar astral lamp, for this purpose, affords a light unsurpassed by any other for brilliancy and quantity of luminous power; and the letter of Mr. Milford, collector at Cleveland, Ohio, (Appendix No. 9,) shows that the burning of this oil has been introduced with entire success into the light-houses on Lake Erie. An objection has been made against lard oil, that it is not capable of being preserved in a liquid state in cold weather; but by a process similar to that by which the winter sperm is prepared, lard oil can be made which will not chill at 30° Fahrenheit.

The importance of this application of lard can scarcely yet be realized. Vast quantities of the oil can be manufactured at the west. Indeed, there is hardly any assignable limit to the power of production of the article, so that, while the demand continues, the business may be conducted profitably. The immense herds of swine which can be suffered to range over the lands adapted to them, and gather their food from mast as well as the surplus of corn, wheat, potatoes, &c., on which they may be sustained, admit of the manufacture being carried on to almost any extent.

The proportion of lard to the whole hog is about 60 per cent., after taking out the hams and shoulders or taking out the hams only; the estimate for hogs of the best breeds, and so fed as to produce the greatest quantity of fat, is 70 per cent. As the object in this case is not to make pork for food, the objection against those species of nuts, and other modes of feeding which render the animal more gross and oily, is obviated; and it has been proposed to feed out oil cake to swine, to increase the proportion of oil. An important letter, in relation to the manufacture of lard oil, &c., will be found, together with Mr. Morfit's account, before mentioned, in the Appendix Nos. 8 and 10, the necessity of the publication of which is every day becoming more and more apparent from the continual demand on the Patent Office for copies of the mode of extracting the oil from lard. The specification of one manufacturer who has patented his process has also been added for the same reason, as numerous copies are continually requested, (Appendix No. 11.)

By a new process of steaming, (a very simple method, a description of which will be found in the letter of Mr. Stafford, before mentioned, in the Appendix No. 10,) it appears that the whole of the lard or oily matter in the hog, or of tallow in cattle, may be obtained; while the danger of burning (common in other modes) is avoided, the consumption of fuel lessened, and the degree of pressure required not so great as otherwise. It will be recollected that, while conducting the manufacture of lard, the other parts of the animal, as the hams and shoulders, may be turned to profit. Besides these, also, the hides may be tanned by a cheap process; and the bones, which are worth half a cent per pound, may be calcined and made into animal carbon, for which they are said to be worth, in this calcined state, two and a half cents per pound.

Oil is likewise made of the SUNFLOWER—35 gallons to an acre. The cultivation of the CASTOR BEAN continues to be carried on with increasing success for the manufacture of castor oil, which may also be turned into stearin and oil for burning. A single firm in St. Louis, has worked up 18,500 bushels of beans in four months, producing 17,750 gallons of oil, and it is stated that 800 barrels have been sold at $50 the barrel. This oil, likewise, admits of being prepared for machinery, soap, &c., and it is much more soluble in alcohol than lard. A new experiment, too, as to the introduction of RAPE SEED, for the same purpose, promises much success, as it is found

that rich ground will produce from 25 to 40 bushels to the acre. Ten quarts of oil may be obtained from a bushel of the seed. Oil cake is worth, per bushel, about the same as oats. This oil sells for from 75 cents to $1 the gallon. For further details as to this experiment, reference may be made to the letter of the postmaster at Erie, Pennsylvania—Appendix No. 12.

A more beautiful article of lard is now also manufactured, which is of the purest white, and much harder than the ordinary kind, and which thus possesses additional advantages for exportation, as it will bear being sent to the warmer climates, and can be prepared by a rapid process which costs not over half a cent the pound. The details of this will be fonnd in Mr. Stafford's letter previously referred to in Appendix No. 10.

These various articles just mentioned, have been brought together, as they are of a kindred character, and constitute a branch of business which is probably destined to become a most important one in our country. It may be well, indeed, to look at this subject a little more closely, and in detail to ascertain the means we have of future production, as this lard is one of the articles on which the duty in England and France are so low as to bear exportation. In the first place: What are the materials of manufacture at home? The live animals can be raised at little comparative expense; and this business, as we have before said, can be carried on to almost any extent.

Few persons, who have not taken the trouble of calculation, are aware of the results of an examination into this subject. It would be thought strange, were the assertion made, that the export of oil, pork, and lard, were a market opened to us, might be equal to that of our heaviest staples—even to that of cotton; but it is believed that it can be strictly demonstrated that not only this is true, but that it might reach in value beyond all the exports from this country the past year. The calculation is an easy one: Pork can be raised in all the states; and wherever there exists mast and wild vegetable roots, the expense is very trifling; for, it will be remarked, that, for the purpose of making oil, it is immaterial how great is the degree of oleaginous food, which is given to swine. Beech, oak, hickory, and walnut, all furnish excellent food. Corn, too, may be raised on the prairies at $3 per acre, standing in the field, where the swine are turned in to feed; making the cost 6 cents per bushel—allowing (which is a fair estimate) 50 bushels to the acre. If any one doubt the practicability of this, it will only be neeessary to consider the fact, that one man can attend to 40 acres, which, beginning early in the season, he can plough with horses at the rate of 2 acres per day, plant with the cornplanter from 5 to 10 acres a day, and then till it with the cultivator. At $3 per acre, the supposition before mentioned, this would make his receipt for the 3½ or 4 months employed $120 or $30 to $35 a month, for wages, expenses, &c. As a further means of keeping the swine, rye may be sown on the ploughed sod to furnish winter food; and, by taking them off in the spring, a crop of rye may be raised, making a good sustenance for the swine—they being turned in to feed upon it standing after it is ripe. It has likewise been found that, since the animals scatter some of the grain on the field, the same piece of ground will yield 2 or 3 seasons without any extra ploughing. It may also be remarked, in passing, that rye pastures are found to be excellent for wintering cattle without injury to the crop of grain, if the stock is taken off early in the spring.

Such, then, are the facilities for raising swine. We can, however, carry the calculation further. The number of swine reported in the census for 1839 is over 26,300,000.—There is reason to believe that the number has very greatly increased in many of the Western States since that time. Thus, it is stated, that, in Michigan, in 1837, when the State census was taken, the number of hogs reported was 109,096; in 1839, by the United States census, was reported the number 342,920, being an increase in only two years of 232,535, or more than 100,000 in a year. It is supposed, by a writer who appears to be well acquainted with the products of that state, that in 1841 there were not less than 700,000 swine in the state; according to which ratio there would probably be now over 1,000,000. The whole number in the United States, therefore, estimated simply at an increase of 5 per cent. the year, would now exceed 30,000,000. Taking this, therefore as a fair estimate, and allowing that one-half of them should be fatted to average 300 lbs., and for the purpose of lard they would need to weigh 300 or 400 lbs., we should have the following results, viz: 15,000,000 hogs, weighing 4,500,000,000 lbs. Deducting the two hams, which might be estimated at 20 lbs. each, allowing also a loss of one-third in curing, is equal to 400,000,000 lbs., and trying up the remainder, equal to 39,000,000 lbs., on which 60 per cent. of lard might be obtained, gives 2,340,000,000 lbs. of lard; and since 8 lbs. of lard equals a gallon of oil and stearin combined, this amounts to 292,500,000 gallons, which is equal to 9,285,714 barrels. This is more than 25 times the amount of sperm and whale oil annually brought into the United States, including also palm and olive oils. Allowing 40 lbs. for the two hams, as we have seen, gives 400,000,000 lbs. Estimating now the lard oil and stearin combined at 50 cents per gallon and the hams at 6 cts. per lb., we have the enormous sum total of $170,250,000. This would probably equal over three times the export value of cotton at the present low price or perhaps even the whole crop for this year; as the whole crop for 1842, according to the best estimate which a careful examination enables us to make, amounts to 683,333,231 lbs., which, at 6½ cents per lb., is $44,416,650. This, too, is nearly double the whole value of our exports, as appears from the report of the Secretary of the Treasury.

It is, indeed, admitted that we have not and probably may not for a long time, if ever, have so large a quantity of lard and hams for exportation; but the supposition is only made to show the capabilities of the country in this respect. There is not the slightest difficulty,

were the effort made, in doubling the number of swine in the United States, so that the whole surplus above the present number could be thus used for the manufacture of lard and oil. Besides the articles mentioned in the case supposed above do not require salt, and may be preserved with great ease, as well as allow the animals to be killed earlier, so as to secure a full market; and the former is a consideration of no small importance, especially in portions of the country where salt is high. It will be found more profitable at present, at the price of lard and oil abroad, to use the whole hog for this purpose, the hams and sides excepted. It should be mentioned, too, here, that in the above calculation no account has been taken of a variety of articles which are worth something, and which might aid to defray the expense of the preparation of the lard and hams. Thus, as to the hides, they may be taken off with the hair at about the same expense as by scalding, and may be tanned at $5 per dozen or preserved by sprinkling the fresh hides, spread out smooth, with salt, laying one over another, flesh sides together, until there are fifty or sixty together. They can then remain in this state until cured, and may be rolled up and transported to any market.—The leather of these hides, when tanned, is used not only for saddles, collars, trunks, but also for binding books—a substitute for Russia leather—and many other purposes. The bristles will pay in part for preparing the hides for the market. Hides, when well curried, will bring, it is said, from $15 to $50 per dozen. Hams, too, are said to be better when cured without skins, as the gum of the skin injures the taste of the meat and retards the salting operation.

It may be remarked here, also, that a demand for oil and candles from lard will of course greatly advance the price of pork for consumption, and thus, while a new staple is created, an old one is greatly improved. An increase of only one cent per pound on swine slaughtered in the United States will make an aggregate in value of at least $30,000,000.—This sum would not indeed actually be realized in cash, as little pork, comparatively, is now sent to market, but is consumed by the family where it is raised. *That country which produces beef and pork to most advantage, and especially if wheat is also added, must excel in agricultural profits.*—pp. 39, 44.

In a subsequent number, we shall revert to this interesting document, and make further extracts. The author is ardently devoted to the interests of agriculture; and his efforts, directed no less by intelligence than zeal, will powerfully contribute to their advancement. The report cannot fail to be favorably received by the public, and we notice that the editors of the New York Tribune have printed a large and cheap edition for general circulation. We could wish that a copy might reach the hands of every reader in the community.

POUDRETTE.

I remember to have promised you some time ago a short account of my method of preparing manures from human excrements. I will now redeem that promise, hoping that it may be useful to many of your subscribers. First, I collect the stercoraceous matters separately in large vessels or hogsheads, after the urine has become putrid, which will require but two or three days in warm, and ten or fifteen in cold weather. I then add sulphuric acid to the urine slowly; if the urine is putrid, a powerful effervescence will immediately take place; the acid must be added until effervescence ceases. By this process, the carbonic acid in combination with the ammonia, is disengaged and driven off, and sulphate of ammonia is formed, which has no volatility, except at a very high temperature. Thus you secure the ammonia formed by putrefaction, which otherwise would escape. I then add the liquid to the solid excrements, incorporating them well together, until a very thin batter is formed; into this mass I stir in finely pulverized charcoal, according to my judgment, without regard to any precise quantity; this done, I spread the mass upon boards made tight, in the open air—stir frequently until the whole is dry, then pulverize with a spade, and barrel it up for the use of crops.

My drying boards are protected from the weather by a shed open to the south, so as to receive the benefit of the sun. Manure made in this way I call *poudrette*, and of its value I can speak in the highest terms. When properly made, it is inodorous, and the application to crops easy, and the effect powerful. I made an experiment with it last season upon sugar beet, in comparison with bone dust, bone dust and stable manure mixed, and stable dung alone. The beets manured with poudrette came up quicker, grew faster, and maintained a decided superiority to the last, making the largest and best beets; the quantity of poudrette was only a small train to each drill. I used it also upon corn with entire success. In this experiment I subjected it to a very severe test; I selected a very poor spot, put only one and a half gills to the hill as a top dressing, at the time of planting, and the result was truly astonishing, proving it to be beyond all doubt a manure of great strength and power, perhaps surpassing all others *now known*.

It must in all cases be used as a top dressing; such is its strength when planted with seed, the germ is destroyed, and consequently does not come up.

I shall make about one hundred barrels this season, which I intend to use chiefly on corn the coming spring, from which I anticipate the best results.

When I commenced I intended to say something about what I have been doing in bone dust, dead horses, pigs, dogs, cats, &c., but I am reminded in your editorial what great severity your correspondents may expect at your hands, and as my piece is already much longer than *my* "*hand*," I shall close.

Southern Planter. GEORGE WOODFIN.

LUCERN FOR SOILING.—SUGAR BEET.

Flushing, Queen's co., Feb. 10, 1843.

I noticed in the last number of your paper, an article on the cultivation of rye, vetches, peas, and corn, sown broadcast, and cutting them for soiling stock. Now I should much prefer lucern to any of these, for an acre of it will keep five cows from the middle of May to the middle of October, if cut and given them when green, and it may be cut five times for soiling, and three times for hay during the summer. It will produce three tons of hay to the acre the first cutting, and one and a half tons each succeeding cutting.

It flourishes most luxuriantly in deep, rich friable loams, though it will also thrive in any good, dry soil; but the land must be kept as free as possible from weeds, otherwise its growth will be greatly impeded. No land is too rich for it, and the soil must be deep and dry, otherwise it is useless to attempt to grow lucern. The potato crop heavily dressed with long manure is a good preparation for it, and the ground should be ploughed as deeply as possible, as it is a tap-rooted plant, and in a loose sandy soil the roots have been known to run to the depth of four feet; the seed should be sown from the 1st to the 15th of May. It may be sown on a crop of wheat, rye, or barley; twenty pounds of seed should be allowed to the acre, be put in with a light harrow, and the operation finished with the roller. The ground should be harrowed every spring to destroy grass and weeds, and occasionally top-dressed with bone dust, ashes, or rotted manure, as best suits the convenience of the farmer. It is an excellent food for horses and cows whether in a dry or green state; and when well laid down and properly attended to, it will last ten years. It is quite as hardy as red clover, and much more valuable.

I have raised the sugar beet for several years, and think them very valuable food for stock, milch cows particularly, making them give an abundance of the richest milk, quite equal to that produced from grass; they are also very good for hogs. I have fed them to my breeding sows and store hogs, together with the wash of the kitchen, and they are now in as good order as any farmer need desire; but a Berkshire will get fat where a razor-back would starve. W.

American Agriculturist.

TO PREVENT MICE, GRUBS AND INSECTS FROM HARBORING AROUND THE ROOTS OF FRUIT TREES IN WINTER.—Before the ground is frozen in the fall, scrape away the loose mould from the trunk and supply its place with lime and ashes—mice and moulds will not come to disturb the bark and burrow among the roots, when so strongly protected with alkalies; and the insects and their larvæ will be effectually exterminated by the contact, and the tree and its fruits will be saved from their destructive ravages the following season. The value of this application as a manure for the tree will abundantly remunerate the trouble and expense.

CONTENTS.

ORIGINAL COMMUNICATIONS.

	Page
Report to Board of Agriculture, on Rockbridge county	65
Fence law of Virginia	82
Rust in wheat	83, 97
Cultivation of corn	98
Agricultural advantages of East Florida	101
Fertilizing effects of the subsoil	102
Editorial correspondence:	
Improvement of clay soils. Paring and burning bone-dust	110
Destruction of wild onions. Rotten fish, Gypsum, &c.	110
Breeding saddle horses	111
Peach trees. Grub. Lady bug	111
On surface manuring, &c.	112

SELECTIONS.

	Page
Altering male quadrupeds	66
Pumpkins	66
Nutritive qualities of charcoal	66
Ashes for top-dressing, &c.	67
Neatness in agriculture	67
Vegetable physiology and chemistry	68
Jerusalem artichoke	76
Effects of charcoal on vegetation	78
Practical farming	79
Stables, litter, &c.	80
The orchard	81
The farmer's residence	82
Cholic in horses	83
White carrots	84
Report to Board of Agriculture:	
Of mill-ponds, as producers of malaria and disease	85
Pruning fruit trees	93
Improved culture of cotton	94
White carrots as a field crop	96
Wearing flannel	96
Grass	99
Draining and manuring	100
To cure sheep-skins with the wool on	100
Recipe for making good bread	102
Ruta baga	102
Roots	103
Manures	105
Liebig's Animal Chemistry	105
The peach tree	107
Application of manures	108
Soap-suds	109
Subsoil ploughing	109
Action of alkalies on soils	111
Immense successive crops of wheat	114
Report of Dr. Playfair's lecture	115
Salt	119
Report of Commissioner of the Patent Office	119
Poudrette	127
Lucern for soiling. Sugar beet	128
To prevent mice, grubs and insects from harboring around the roots of fruit trees in winter	128

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EDMUND RUFFIN.

December 30, 1842. Petersburg, Va.

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The Bank Reformer (published in 1841–2) complete in 6 numbers and supplement, (104 pp.) 50 cents the copy.

The Southern Magazine, 2 nos. only, making 192 pp., 50 cents.

January 6th, 1843. EDMUND RUFFIN.

Union Livery Stable.

THE Subscriber has lately taken the Union Stable, which is well known for its convenience. He has thoroughly repaired it, and is now prepared to receive horses to board either by the month, week or day, or single feed. He begs a liberal share of patronage from the public, assuring them that he will spare no pains to give satisfaction. He has procured a good hostler, and also intends to give his whole attention himself; and from the long experience he has had with horses, he assures the public he knows how they should be treated. Gentlemen can choose the feed of their horses, either corn, fodder, oats, hay or hominy.

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Feb. 4—4t JOHN M. WELLS.

Checks, Bonds, &c.

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LUCERN FOR SOILING.—SUGAR BEET.

Flushing, Queen's co., Feb. 10, 1843.

I noticed in the last number of your paper, an article on the cultivation of rye, vetches, peas, and corn, sown broadcast, and cutting them for soiling stock. Now I should much prefer lucern to any of these, for an acre of it will keep five cows from the middle of May to the middle of October, if cut and given them when green, and it may be cut five times for soiling, and three times for hay during the summer. It will produce three tons of hay to the acre the first cutting, and one and a half tons each succeeding cutting.

It flourishes most luxuriantly in deep, rich friable loams, though it will also thrive in any good, dry soil; but the land must be kept as free as possible from weeds, otherwise its growth will be greatly impeded. No land is too rich for it, and the soil must be deep and dry, otherwise it is useless to attempt to grow lucern. The potato crop heavily dressed with long manure is a good preparation for it, and the ground should be ploughed as deeply as possible, as it is a tap-rooted plant, and in a loose sandy soil the roots have been known to run to the depth of four feet; the seed should be sown from the 1st to the 15th of May. It may be sown on a crop of wheat, rye, or barley; twenty pounds of seed should be allowed to the acre, be put in with a light harrow, and the operation finished with the roller. The ground should be harrowed every spring to destroy grass and weeds, and occasionally top-dressed with bone dust, ashes, or rotted manure, as best suits the convenience of the farmer. It is an excellent food for horses and cows whether in a dry or green state; and when well laid down and properly attended to, it will last ten years. It is quite as hardy as red clover, and much more valuable.

I have raised the sugar beet for several years, and think them very valuable food for stock, milch cows particularly, making them give an abundance of the richest milk, quite equal to that produced from grass; they are also very good for hogs. I have fed them to my breeding sows and store hogs, together with the wash of the kitchen, and they are now in as good order as any farmer need desire; but a Berkshire will get fat where a razor-back would starve. W.

American Agriculturist.

TO PREVENT MICE, GRUBS AND INSECTS FROM HARBORING AROUND THE ROOTS OF FRUIT TREES IN WINTER,—Before the ground is frozen in the fall, scrape away the loose mould from the trunk and supply its place with lime and ashes—mice and moulds will not come to disturb the bark and burrow among the roots, when so strongly protected with alkalies; and the insects and their larvæ will be effectually exterminated by the contact, and the tree and its fruits will be saved from their destructive ravages the following season. The value of this application as a manure for the tree will abundantly remunerate the trouble and expense.

CONTENTS.

ORIGINAL COMMUNICATIONS.

	Page
Report to Board of Agriculture, on Rockbridge county	65
Fence law of Virginia	82
Rust in wheat	83, 97
Cultivation of corn	98
Agricultural advantages of East Florida	101
Fertilizing effects of the subsoil	102
Editorial correspondence:	
Improvement of clay soils. Paring and burning bone-dust	110
Destruction of wild onions. Rotten fish, Gypsum, &c.	110
Breeding saddle horses	111
Peach trees. Grub. Lady bug	111
On surface manuring, &c.	112

SELECTIONS.

	Page
Altering male quadrupeds	66
Pumpkins	66
Nutritive qualities of charcoal	66
Ashes for top-dressing, &c.	67
Neatness in agriculture	67
Vegetable physiology and chemistry	68
Jerusalem artichoke	76
Effects of charcoal on vegetation	78
Practical farming	79
Stables, litter, &c.	80
The orchard	81
The farmer's residence	82
Cholic in horses	83
White carrots	84
Report to Board of Agriculture:	
Of mill-ponds, as producers of malaria and disease	85
Pruning fruit trees	93
Improved culture of cotton	94
White carrots as a field crop	96
Wearing flannel	96
Grass	99
Draining and manuring	100
To cure sheep-skins with the wool on	100
Recipe for making good bread	102
Ruta baga	102
Roots	103
Manures	105
Liebig's Animal Chemistry	105
The peach tree	107
Application of manures	108
Soap-suds	109
Subsoil ploughing	109
Action of alkalies on soils	111
Immense successive crops of wheat	114
Report of Dr. Playfair's lecture	115
Salt	119
Report of Commissioner of the Patent Office	119
Poudrette	127
Lucern for soiling. Sugar beet	128
To prevent mice, grubs and insects from harboring around the roots of fruit trees in winter	128

ADVERTISEMENTS & NOTICES.

Full sets of the Farmers' Register, in ten volumes.

THE first series of this work under the editorship of the undersigned being now finished, either full sets, or separate volumes, are offered for sale at the following prices, to be paid in advance with the sending of the written order.

The ten volumes complete, stitched in separate numbers, - - - - - $25

The same, in neat and strong half binding, (leather backs and corners,) the price of binding (50 cents,) only added, making - $30

For separate volumes or parts of the set—

Either one of vols. 1, 2, 3, 4, 5 and 6, in numbers - - - - - $5

Of same, any three copies or volumes, together, - - - - - - $10

Any two or more copies or volumes of either 7, 8. 9, 10, at the rate of $2.50 each.

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Each volume (or yearly issue) of the Farmers' Register consists of 776 or more large and closely printed pages. The editor may presume to say that the whole work contains the best instructions on almost every useful and interesting branch of agriculture, scientific and theoretical, as well as practical—and in relation to the science and art of agriculture in general, though more especially designed for the region south of "Mason and Dixon's line." Besides the much larger mass of ordinary periodical matter, there are published in the series the following entire works: Johnstone on Draining, Embankments, &c.; Davy's Agricultural Chemistry, from the last (improved) English edition; Taylor's Arator; the Westover Manuscripts (being the first and only publication of this old and interesting work;) and the latest (third) and much enlarged edition, just completed, of the Essay on Calcareous Manures.

EDMUND RUFFIN.

December 30, 1842. Petersburg, Va.

Books for sale.

THE following works published by the undersigned, may be obtained separately, through the mail or otherwise, at the following prices, to be remitted with *post paid* orders:

Johnstone on Draining, Embanking, &c., (from the latest London edition,) 75 cents the single copy, or $5 for 10 copies. This is the best work extant on this subject, and is illustrated by numerous wood cuts.

Davy's Elements of Agricultural Chemistry, from the latest London edition, 75 cents the single copy, or $5 for 10 copies.

The Westover Manuscripts, written by Col. William Byrd in 1728–36—144 pages, super-royal 8vo.; 75 cents the single copy, or $5 for 10 copies.

Essay on Calcareous Manures, third edition greatly enlarged and improved, 320 pages, super-royal 8vo., bound in flexible covers (for mail conveyance) $1.25 the single copy or $5 for 5 copies; in best style of cloth binding, $1.50 the single copy. The remaining copies of the previous (2d) edition of this work may be had for 50 cents the single copy, or $5 for 25 copies.

The Bank Reformer (published in 1841–2) complete in 6 numbers and supplement, (104 pp.) 50 cents the copy.

The Southern Magazine, 2 nos. only, making 200 pp., 50 cents.

January 6th, 1843. EDMUND RUFFIN.

Union Livery Stable.

THE Subscriber has lately taken the Union Stable, which is well known for its convenience. He has thoroughly repaired it, and is now prepared to receive horses to board either by the month, week or day, or single feed. He begs a liberal share of patronage from the public, assuring them that he will spare no pains to give satisfaction. He has procured a good hostler, and also intends to give his whole attention himself; and from the long experience he has had with horses, he assures the public he knows how they should be treated. Gentlemen can choose the feed of their horses, either corn, fodder, oats, hay or hominy.

He keeps also Saddle and Harness Horses for hire, and vehicles to go with them when wanted. Drovers and Horse Dealers will find the accommodations at this stable of a superior kind. Prices according to the times.

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Black-Hawk was got by the imported horse SARPEDON. His dam by a son, out of a thoroughbred mare, of Hyde's imported English Hunter—g. dam by Roe-Buck (Roe-Buck was incomparably the finest saddle horse ever raised in Virginia; and his numerous descendants are remarkable for their gaits and other useful qualities—for pedigree of Roe-Buck see American stud book)—g. g. dam by imported Bedford; g. g. g. dam by imported Diomed, out of the imported mare Jinnette. Showing the English Hunter cross to be the only impurity in his blood; and it is from this cross and the Roe-Buck that he gets his size, power, and useful qualities.

He is eight years old the coming spring—stands fully sixteen hands high under the standard, with as little daylight under him as any horse of his inches. He is of a rich dark dapple mahogany bay, approaching to black, with no white except a slight pencilling around the coronet of one hind foot, with flowing and waving mane and tail of glossy black. His form has been pronounced, by the best judges, unexceptionable. His action is strong, high, and agile; his carriage lofty; and his whole figure and appearance highly expressive of power, activity, and beauty

To those having good mares, and who are desirous of having saddle and harness horses of the first order, this horse is offered.

He will stand at my plantation (Belmead) in the county of Powhatan, six miles from the Court House, at $15 the season, with 50 cents to the groom, payable when the mare is sent. Season to commence on the 15th of March, and end the 15th of July. Mares from a distance will be fed at 25 cents per day—or pastured gratis—but no liability will be incurred in any case for accidents or escapes.

Address my agent, W. E. Bradley, Jefferson Post Office, Powhatan county.

PHILIP ST. GEO. COCKE.

Feb. 23d, 1843—3t

Terms of Advertising on the Farmers' Register cover.

For a square, (or 16 lines,) 1 month, $1.00

And 50 cents for each continuance.

Or $5 the year.

Address LAURENS WALLAZZ,

January 1, 1843. Petersburg.

Linnæan

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FLUSHING, NEAR NEW YORK.

THIS immense Establishment, formerly the property of Wm. Prince, deceased, is now conducted by the subscribers, with renewed zeal. Every department receives our personal attention, and all orders are executed with promptitude, and with particular attention to the selection of superior trees and shrubbery. Above 300,000 trees are now fit for sale, comprising all the new and superior varieties of fruits and every thing interesting in the ornamental departments. The prices have been greatly reduced, and will be found to offer a great advantage to the purchaser in this respect, and these will be sent *gratis* to every post-paid application. Catalogue No. 1. comprises Fruit and Ornamental Trees and Plants. No. 2. Bulbous Roots and Dahlias. No. 3. Green house plants. No. 5. Garden and Agricultural Seeds.

WM. R. PRINCE & CO.

February 28, 1843—2t

The Farmers' Register

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AGENTS.

Dr. Gideon B. Smith, Baltimore, Md.
Hampton and Sons, Washington City.
Pleasants Stabler, General Agent, now travelling in the south to promote the interests of the publication.

Subscribers to the Farmers' Register

Who have not paid, are earnestly requested to remit the amount of their subscriptions as early as possible.

The Farmers' Register for February, which should have been published the last of this month; has been delayed in consequence of illness in the editor's family.